# ENGINEERING AND MINING JOURNAL

A McGRAW-HILL PUBLICATION

JUNE 1952

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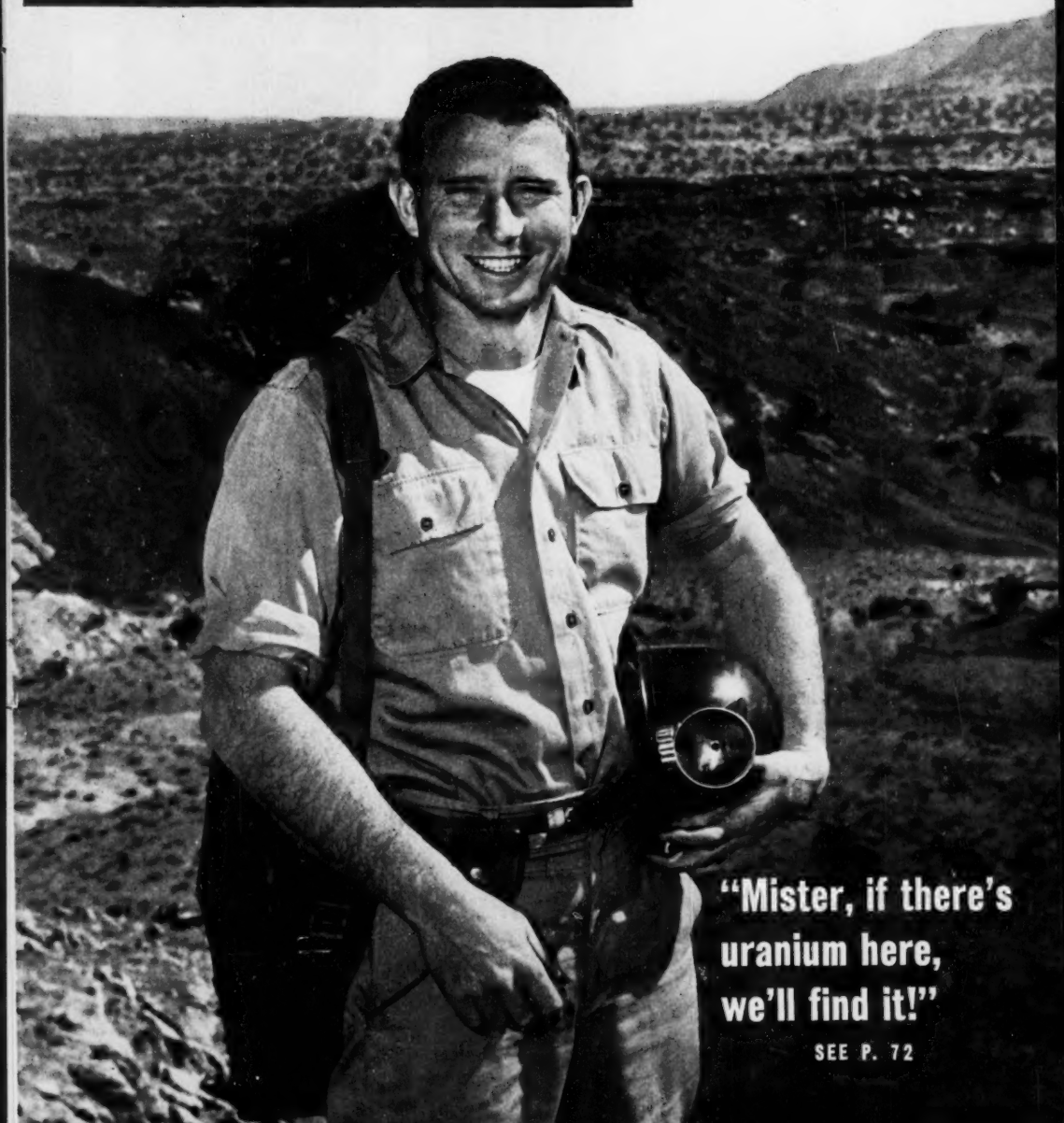
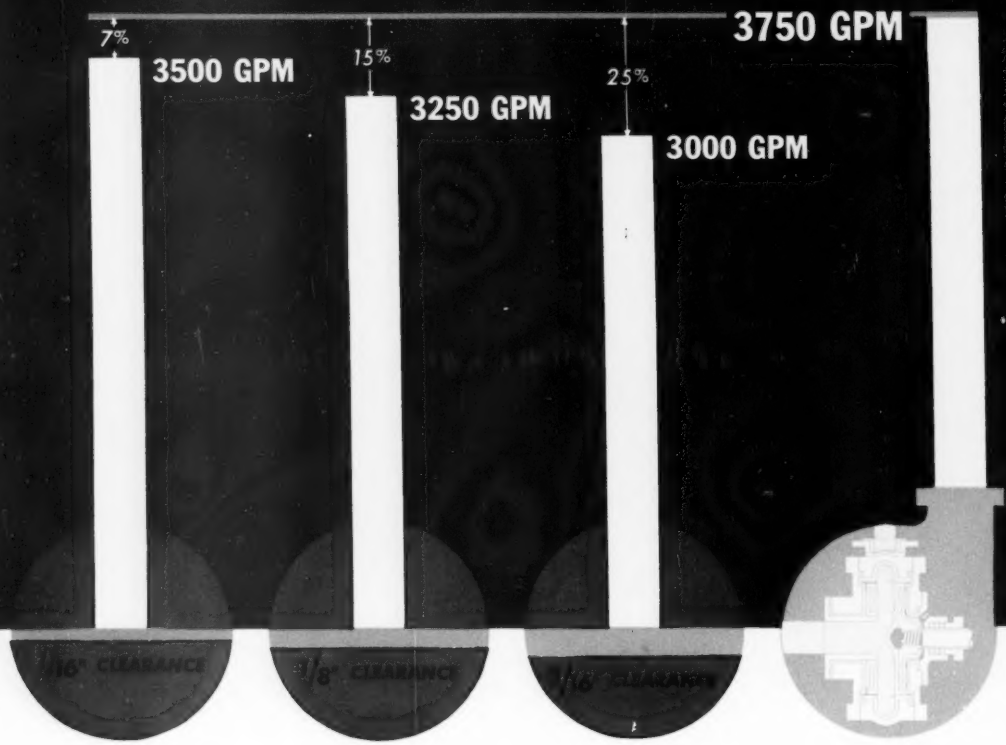


"Mister, if there's uranium here, we'll find it!"

SEE P. 72

# How Hydrosealing pays off




Two twelve-inch dredge pumps were put through the following test. One was of conventional design; the other, a Hydroseal, had clear sealing water between the impeller and side plates to prevent enlargement of the clearance. To simulate normal wear conditions in the conventional pump, clearances between the impeller and side plates were set at 1/16", 1/8", and 3/16". A head of 160 feet was developed for each test, and all other conditions were uniform for both pumps.

As can be seen above, the Hydroseal demonstrated superior performance right from the start, and since its initial performance is maintained without appreciable loss throughout pump life, this superiority will steadily increase as time goes on.

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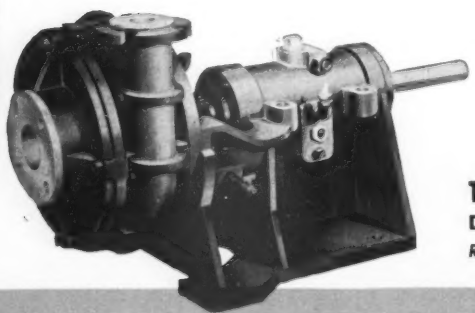

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MAXIMIX RUBBER PROTECTED

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# THE RIGHT POWER and THE RIGHT WEIGHT

for maximum drilling performance

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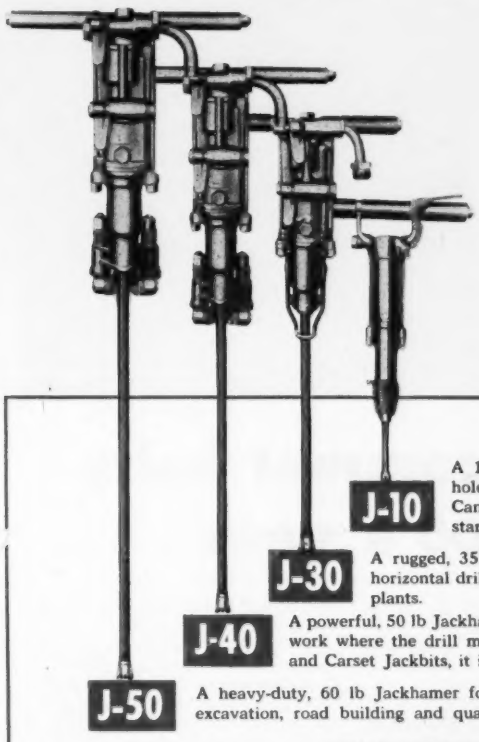

**J-10** A 14 lb Utility Jackhamer, with automatic rotation and hole blowing—for a wide range of light-duty drilling jobs. Can be used with Ingersoll-Rand Carset drilling steels, star drills, chisels, gouges and moil points.

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750-5

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**B.F.Goodrich**
**RUBBER FOR INDUSTRY**

# ENGINEERING AND MINING JOURNAL

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**Subscriptions: Address correspondence to Engineering and Mining Journal—Subscription Service, 1309 Noble St., Philadelphia 23, Pa., or 330 West 42nd St., New York 36, N.Y. Allow ten days for change of address.**

Subscriptions are solicited only from management, production, and maintenance executives and engineers in the metal and nonmetallic mining and refining industry. Position and company connection must be indicated on subscription orders.

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Price of this issue 50c. Subscription rates: United States and possessions, $3 a year, $4 for 2 years, $5 for 3 years. Other Western Hemisphere, $5 a year, $8 for 2 years, $10 for 3 years. Elsewhere $15 a year, $25 for 2 years, $30 for 3 years. **Please indicate position and company connection in all subscription orders.**

Entered as second class matter May 24, 1951, at the Post Office at Philadelphia, Pa., under the Act of March 3, 1879. Copyright 1952 by McGraw-Hill Publishing Co., Inc.—All Rights Reserved. Printed in U.S.A.

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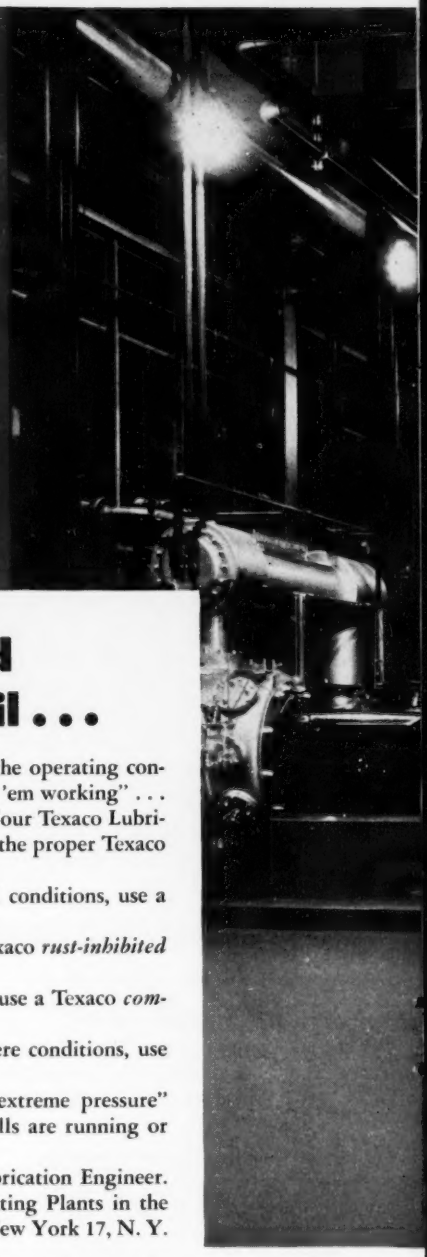

## ...with the recommended TEXACO air compressor oil...

Regardless of age or size of your compressors and whatever the operating conditions, there is a Texaco air compressor oil designed to "keep 'em working" . . . to assure dependable operation and lower maintenance costs. Your Texaco Lubrication Engineer will gladly survey your setup and recommend the proper Texaco air compressor oil. For example:

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- ★★To prevent rust in compressors and systems, use a Texaco *rust-inhibited* air compressor oil.
- ★★To overcome wear due to "wet cylinder" conditions, use a Texaco *compounded* air compressor oil.
- ★★To avoid harmful carbon and gum found under severe conditions, use a Texaco *heavy-duty* air compressor oil.

For rock drills, use *Texaco Rock Drill Lubricant EP.* Its "extreme pressure" properties guard against wear . . . prevent rust, whether drills are running or idle . . . assure longer drill life and lower maintenance costs.

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TEXACO

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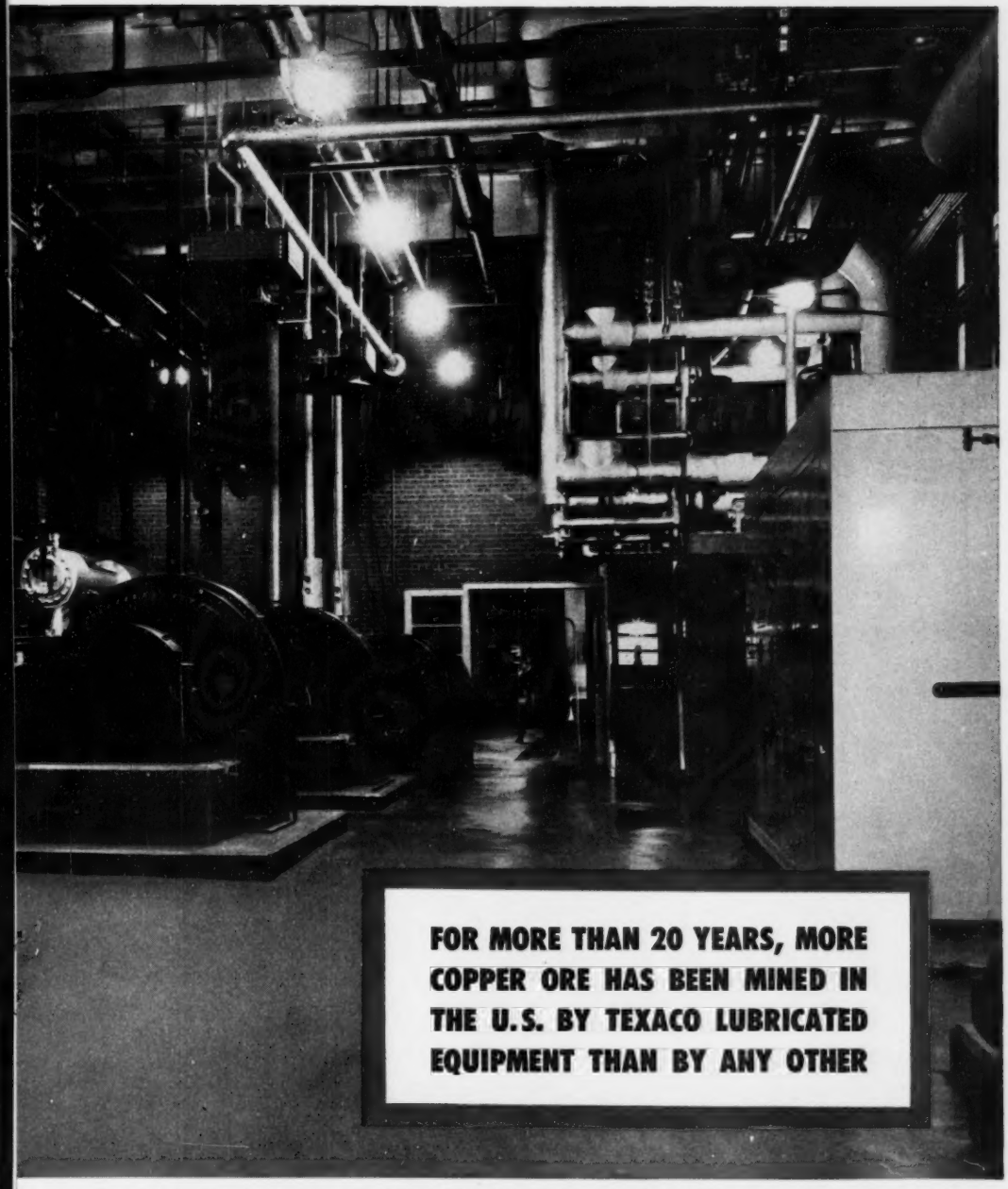


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*Faithfully yours*

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*for Fifty Years*

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40 drawbar hp.
11,250 lb.

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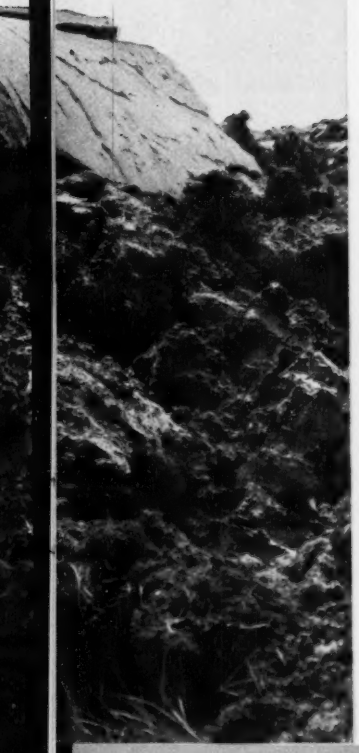
72 drawbar hp.
18,800 lb.

**HD-15**
109 drawbar hp.
27,850 lb.

**HD-20**
Hydraulic Torque Converter Drive.
175 net engine hp.
41,000 lb.

# built to TAKE IT LONGER

## Built for Better Mining—ALLIS-CHALMERS HD-9, HD-15



### Unequalled Lugability

The HD-9 and HD-15 build up greater drawbar pull faster . . . hold it longer than ever thought possible in gear transmission tractors.

For example, when tough going has pulled travel speed down 40 percent, these tractors will have increased their drawbar pull almost 20 percent over rated pull. They will lug down almost 45 percent from rated travel speed before drawbar pull even starts to fall off.

To take full advantage of this important GM 2-cycle diesel engine characteristic, the HD-9 and HD-15 have longer truck frames, lower idlers and sprockets. That means more track on the ground . . . better stability . . . sure-footed traction . . . unequalled *lugability.*

### Extra Long Life

Here are a few of the many reasons why these newest, finest tractors are *built to take it.*

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- **More Power with Bigger Engines — Longer Engine Life**
- **More Weight, Greater Strength**
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- **All New, Specially Designed Track Assembly**
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Your Allis-Chalmers dealer will be glad to explain all of these advantages. See him or phone him now.

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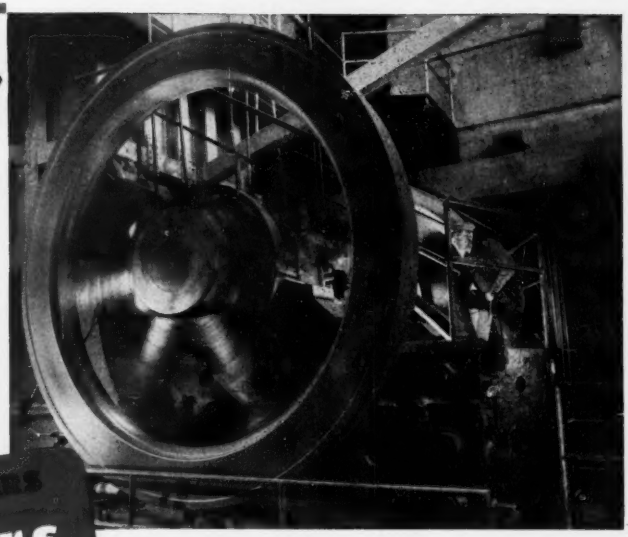
# ALLIS-CHALMERS

TRACTOR DIVISION · MILWAUKEE 1, U. S. A.

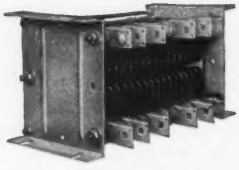
# CONTROL *Engineered* to help produce copper



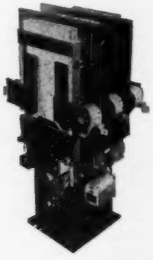
**IT TAKES CONTROLLED POWER** to process copper ore. Crushing run-of-the-mine ore in this giant jaw crusher, for example, takes a 300-horsepower wound-rotor motor and an Allis-Chalmers Type H Starter engineered especially for extremely high starting inertia and variable loads.

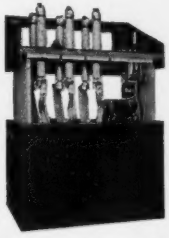
A-3670

**THIS STARTER** controls the motor to provide smooth acceleration in overcoming the inertia of heavy crusher jaws and large fly wheels. This is accomplished by means of a full automatic starter having six secondary accelerating steps.



**EXTRA HEAVY DUTY** resistors in the motor secondary circuit provide starting torque and smooth acceleration. Adjustable time delay relays control closing of the accelerating contactors to cut out successive resistor banks . . . automatically bringing the crusher to speed.





**SELECTION OF PRIMARY CONTACTORS** for every Allis-Chalmers controller is based strictly on job requirements. Allis-Chalmers high voltage starters have either oil-immersed or air-break contactors as standard.

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*There are Allis-Chalmers controllers for use in every industry...starters for squirrel-cage, wound-rotor and synchronous motors. For starters up to 2500 hp at 5000 volts — check with your A-C representative, or write Allis-Chalmers, Milwaukee 1, Wisconsin for Bulletin 14B6410A.*

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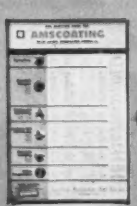


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**CONTINUOUS SERVICE**
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**LOW MAINTENANCE**
•
**LONG LIFE**

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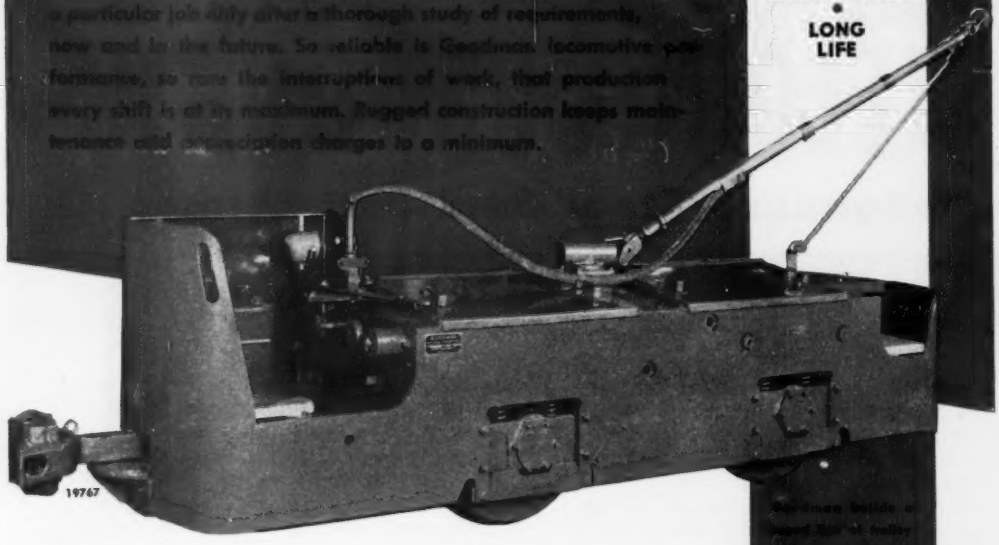


## Typical design features in Goodman metal mine locomotive construction:

- all electrical and working units fully protected from water and muck
- quick acting lever-type brake
- strong protective shield for motorman and trip rider
- anti-riding safety guards on axle boxes and over brake rigging
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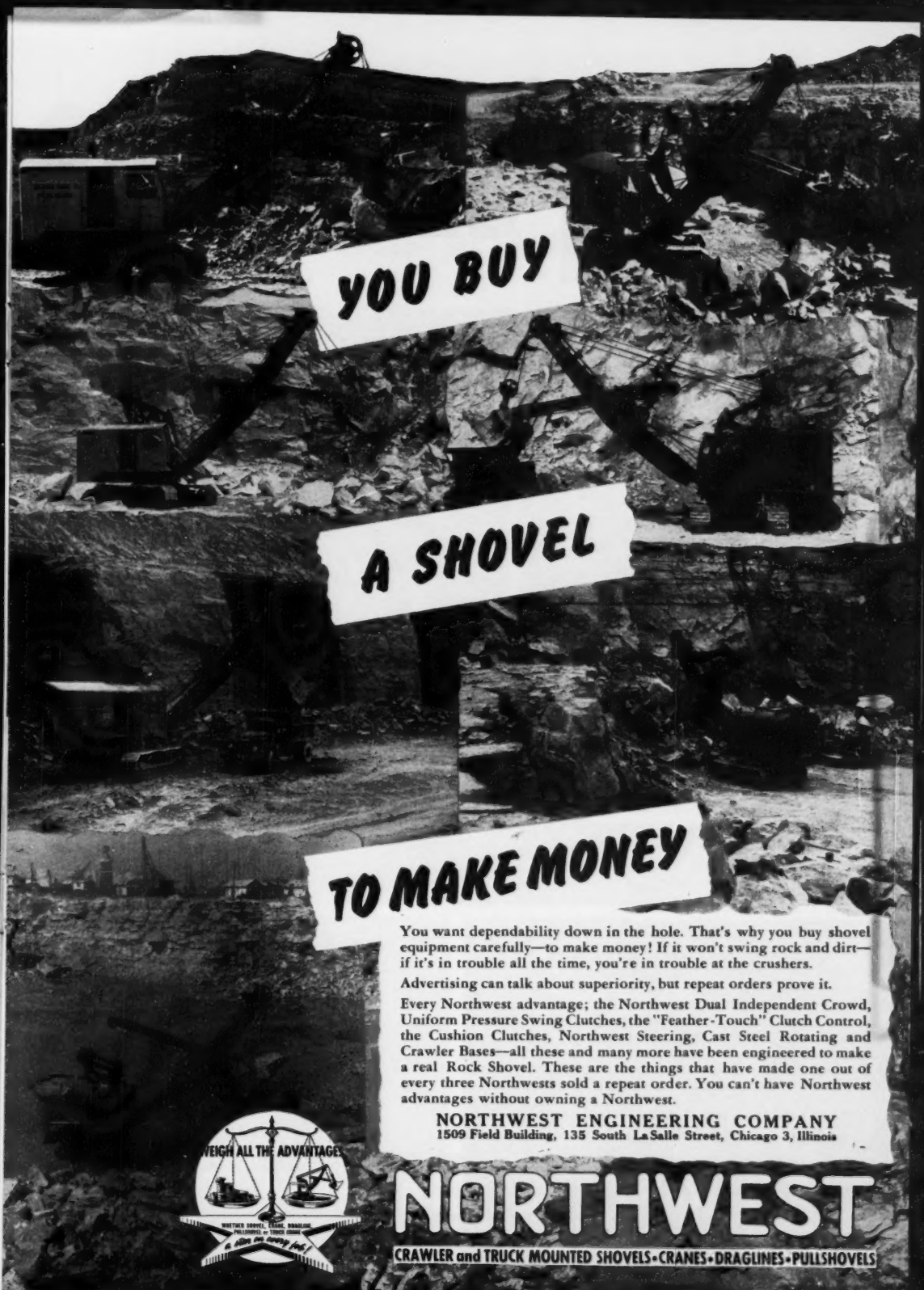


You want dependability down in the hole. That's why you buy shovel equipment carefully—to make money! If it won't swing rock and dirt—if it's in trouble all the time, you're in trouble at the crushers.

Advertising can talk about superiority, but repeat orders prove it.

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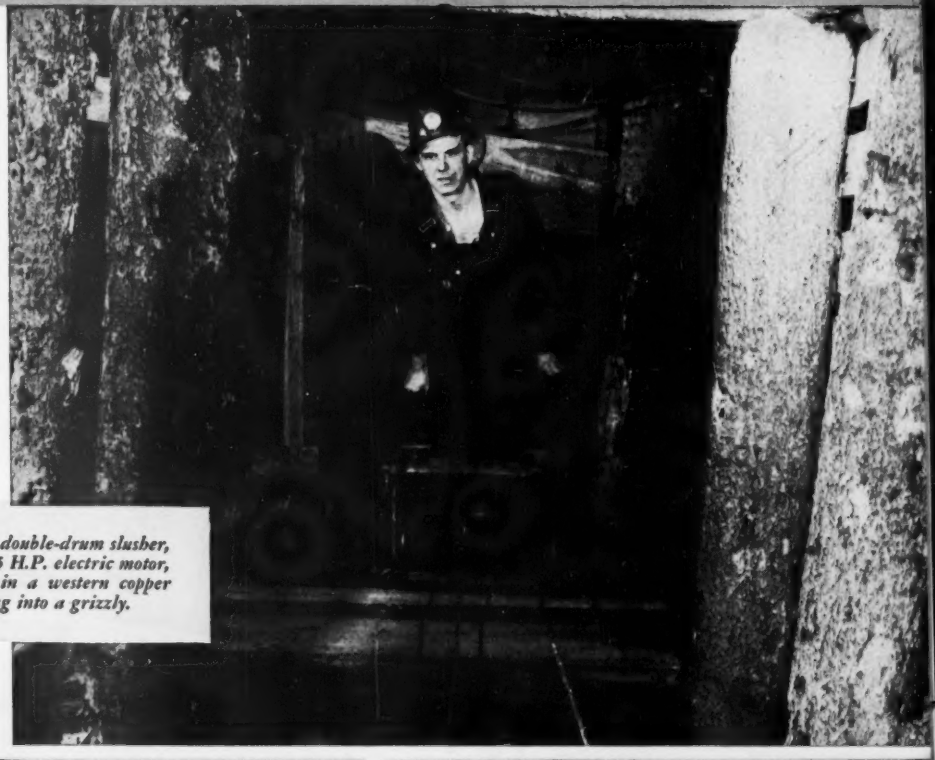
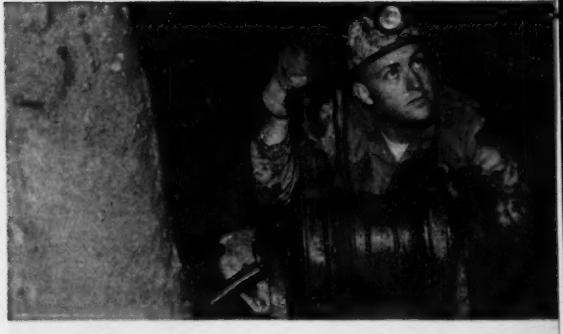
CRAWLER and TRUCK MOUNTED SHOVELS • CRANES • DRAGLINES • PULLSHOVELS

# JOY SLUSHERS



*Joy AAF-211 double-drum slusher, powered by 15 H.P. electric motor, in operation in a western copper mine, scraping into a grizzly.*

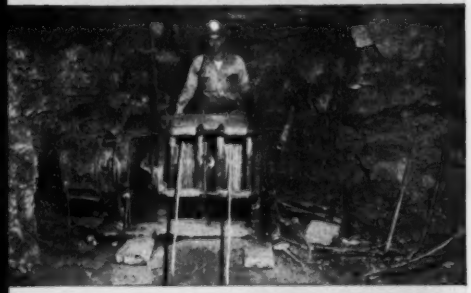


*Joy E-111 Turbinair single-drum hoist on a timber setting operation in a large western mine.*

*Joy HL-3 Shovel Loader mucking out a drift round in a western copper mine.*

# Built with JOY'S intimate knowledge of mining problems...they're scraping millions of tons of muck every year

*Turbinair driven 5 H.P. S-211 slusher scraping ore in a stope in a western fluorspar mine.*



*Electric driven CFA-211 double-drum slusher in operation in a Tennessee zinc mine.*

*25 H.P. B-312 electric slusher scraping ore in a large western Canadian mine.*

Ruggedly built to stay underground longer, JOY Slushers stand up under the heaviest loads and toughest conditions to give you that high efficiency found only in machines which are *designed* for the job and *proved* in the mine. Check these features: they assure more tonnage scraped per shift and longer life with less maintenance.

1. Anti-backlash brakes
2. Positive direct lubrication
3. Shield-type anti-friction bearings
4. Wide choice of pulling and tail-rope speeds
5. Universal rope guides and rope guards
6. Cast steel skid-type frames
7. Large drum diameters
8. Easily removable clutch bands
9. Simple clutch adjustment
10. Gearing enclosed for protection from dirt and dripping water

There's a JOY Slusher in a size and type for every scraping job. You need only to consult a Joy Engineer to get your answer. He can recommend the best loading equipment for your needs because Joy manufactures the only *complete* line of rock loading equipment for mines . . . slushers, track-mounted shovel loaders, and continuous-type trackless loaders.

**WRITE FOR BULLETIN 76-Y**

*Consult a Joy Engineer*

OVER 100 YEARS OF ENGINEERING LEADERSHIP

W&D M3712

# JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

# Here's the Big Difference!

## TAPER-LOCK

*-The Sheave that always runs true!*

The Taper-Lock bushing seats evenly along the entire length of the hub. It is self-seating. There is no collar—no protruding part—no flange to prevent uniform compression.

With full contact, Taper-Lock sheaves run true. Made of finest grade of close-grained semi-steel, cast in the Dodge foundry. Precision grooves have identical pitch diameters so that every belt can pull its share of the load.

Sheave and bushing mount as a unit—easy to align on the shaft. Grips the shaft like a shrunk-on fit. Flush hub means safety.

THERE IS ONLY ONE TAPER-LOCK (a patented product of Dodge). Available from distributors' stocks in a complete range of sizes in A-B combination, B, C and D grooves. Also ask your distributors for Dodge Sealed-Life V-Belts. WRITE for complete data.

**DODGE MANUFACTURING CORPORATION, 3100 Union St., Mishawaka, Indiana**

**DODGE**

*of Mishawaka, Ind.*

**CALL THE TRANSMISSIONEER**
your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified phone book.

# In Devils Den, "*It stands up and takes it*"

The output of the Culver Baer Mine —one of the richest Cinnabar ore mines in the world—is essential for the nation's defense program. Dependable equipment at the mine is essential for uninterrupted production. That's why this "Caterpillar" D7 Tractor with No. 7S Bulldozer is stripping overburden at Culver Baer in Devils Den Canyon, California.

"I have yet to see a tractor that can stand up and take it like 'Caterpillar' machines," says L. A. Hulbert, part owner of the mine. "Day in and day out, all our 'Caterpillar' equipment is ready to go."

Just as this sturdy yellow tractor roots out Cinnabar ore, other "Caterpillar" equipment is working doggedly in mines of every type in every section of the land. All mines need powerful, hard-working machines to cut costly down-time and to increase production.

This rugged equipment is as vital to the defense program as the minerals it mines. You can add to its lasting power by regular, daily maintenance. If you need service, your "Caterpillar" Dealer will provide it promptly and reliably.

**CATERPILLAR,** PEORIA, ILLINOIS

**CATERPILLAR**

REG U. S. PAT. OFF.

DIESEL ENGINES
TRACTORS MOTOR GRADERS
EARTHMOVING EQUIPMENT

# How Bucyrus-Erie Drills Give You

# EXTRA DRILLING TIME

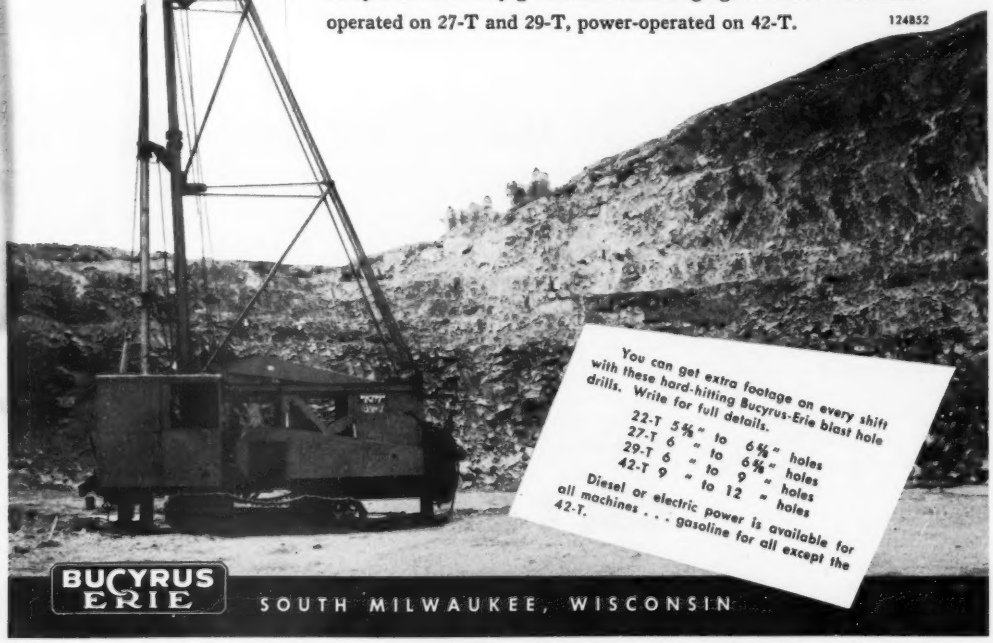
Hard-hitting Bucyrus-Erie blast hole drills cut waste time — spend more hours of actual drilling on every shift. Here are three big reasons why:

1. **Quick Moves.** Mobile caterpillar mountings permit quick moves — over rocky ground, through mud and sand, up steep grades. Steer just like a tractor. Controls are right at operator's station. Such mobility gives you extra time to make the most of the fast, rock-shattering Bucyrus-Erie drilling action.

2. **Quick Set-Ups.** Built-in leveling jacks eliminate time-wasting ground preparation — make possible quick, easy set-ups. Hydraulic jacks, standard on 42-T and available as extra equipment on 29-T, cut out blocking and cribbing — provide stable, three-point drill leveling in seconds.

3. **Quick Tool Changes.** Built-in tool wrenches on all models except 22-T break tool joints quickly — get rid of back-breaking work and the delay that ordinarily goes with tool changing. Wrenches are hand-operated on 27-T and 29-T, power-operated on 42-T.

124852


You can get extra footage on every shift with these hard-hitting Bucyrus-Erie blast hole drills. Write for full details.
22-T 5⅝" to 6¾" holes
27-T 6 " to 6¾" holes
29-T 6 " to 9 " holes
42-T 9 " to 12 " holes
Diesel or electric power is available for all machines . . . gasoline for all except the 42-T.
BUCYRUS ERIE
SOUTH MILWAUKEE, WISCONSIN

# Another Record Setting Conveyor Belt—G.T.M. Designed

FIRST long-center underground conveyor in South Africa, this conveyor belt hauls diamond-bearing clay 1,530 feet below the surface of the ground.

Designed by the G.T.M.—Goodyear Technical Man—this belt has proved *so satisfactory since its installation in 1948 that mine management decided to replace other steel-rope haulage systems with conveyor belts!*

**Thanks to the results experienced with the G.T.M.-designed belt, operators of the mine now specify Goodyear belting 100% for all conveyors, above ground and below.**

**Reasons for this decision are:**

Elimination of frequent derailments, high accident rate and constant breakdowns experienced with rope-and-cart haulage

Saving of 800 man-hours per day over previous system

Appreciably reduced cost-per-ton-handled

**LOOK FOR YOUR GOODYEAR INDUSTRIAL RUBBER PRODUCTS DISTRIBUTOR** *in the yellow pages of your Telephone Directory under "Rubber Products" or "Rubber Goods." He handles Hose, Flat Belts, V-Belts, Molded Goods, Packing, Tank Lining, Rubber-Covered Rolls, built to the world's highest standard of quality.*

# GOODYEAR

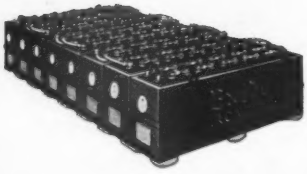
**THE GREATEST NAME IN RUBBER**

# ANNOUNCING

## THE IMPROVED

# Exide-Ironclad

## BATTERY



YEAR AFTER YEAR, one Exide-Ironclad improvement has followed another. It is a record of continuing progress . . . a steady flow of storage battery developments that have made Exide-Ironclad YOUR BEST POWER BUY AT ANY PRICE.

NOW COMES ANOTHER Exide-Ironclad advance . . . . . a polyethylene insulating tube sealer. This and other improvements combine to give you more dependable battery performance and longer-than-ever battery life.

YOUR BEST POWER BUY
. . . AT ANY PRICE

# BUILT TO GIVE YOU...

**RAPID ACCURATE HANDLING . . . UNIFORM RATE OF HANDLING... HIGH AVAILABILITY... LOW OPERATING COSTS... LOW MAINTENANCE COSTS... LOW DEPRECIATION COSTS... HIGH MANEUVERABILITY... SAFE HANDLING**

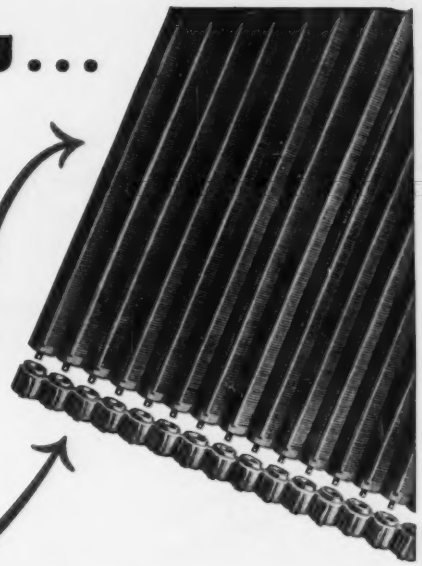
## BECAUSE OF:

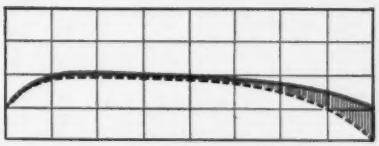
**IMPROVED POSITIVE PLATE CONSTRUCTION**

the long-life grids now contain SILVIUM —an alloy of silver, lead and other components—which make them highly corrosion resistant. Top conducting bar is heavier.

**...with the New Polyethylene insulating tube sealer**

An insulating sealer for the bottom of the tubes. Acid-proof, non-corroding plastic it fits snugly into slotted tubes of positive plate, and reduces loss of active material. Even the small sediment deposit of the past is reduced 50%. Thus, more active material remains available, and the high battery capacity is sustained for longer working life. (See chart at right.)





**PERMANIZED NEGATIVE PLATES**

Improved processing, a result of Exide Quality Control assures uniform plates with higher electrical efficiency. These negatives, teamed with the improved positive plates, give you a well-balanced combination for hard service and long life.

**NEW SEALING COMPOUND**

Through the cooperative efforts of Exide Laboratories and the Franklin Institute, a new homogeneous compound was developed. It makes a permanent seal between the jar and cover, resisting shock without cracking in high or low temperatures.

**SEAMLESS SHOCK-PROOF JAR**

Made of high quality rubber. A scientifically selected combination of tensile strength and elongation provides a sturdy jar built for long life and heavy-duty service.

**CORROSION-RESISTANT TRAY GUARD**

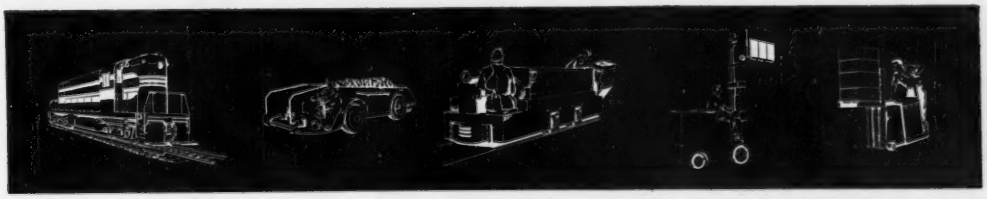
A plastic acid-resistant steel tray coating with high insulating quality and ability to withstand hard knocks.

**NEW UNBREAKABLE PLASTIC VENT PLUGS**

Made of unbreakable polyethylene. Can be quickly and easily removed to add water.

Types and sizes for storage battery applications for every heavy-duty service.

*Write today for further information.*



**THE ELECTRIC STORAGE BATTERY COMPANY**

**Philadelphia 2**

***Exide Batteries of Canada, Limited, Toronto***

"EXIDE-IRONCLAD" and "PERMANIZED" *Reg. Trade-marks U.S. Pat. Off.* "SILVIUM" *T.M. Reg. applied for*

## "SYMONS" CONE CRUSHERS ARE ON THE JOB

● The important role that *"SYMONS"* Cone Crushers play in recovering the valuable mineral resources found in the earth's surface can be traced throughout the world. *From the taconite iron ore mines of Kirkenes, Norway, far above the Arctic Circle . . . to the diamond mines of South Africa* . . . you will find *"SYMONS"* Cones on the job.

The world-wide use and acceptance of *"SYMONS"* Cone Crushers by leading companies engaged in the production of ores and industrial minerals is evidence that the *"SYMONS"* Cone is outstanding in its performance from the standpoint of *finely crushed product—great capacity* and *low crushing cost.*

**NORDBERG MFG. CO, Milwaukee, Wisconsin**

*"SYMONS" . . . A NORDBERG TRADEMARK KNOWN THROUGHOUT THE WORLD*

**"SYMONS" Cone Crushers . . . the machines that revolutionized crushing practice . . . are built in Standard, Short Head, and Intermediate types, with crushing heads from 22 inches to 7 feet in diameter—in capacities from 6 to 900 tons per hour.**

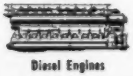
C452

"SYMONS" Primary Crushers

Grinding Mills

Mine Hoists

"SYMONS" Vibrating Bar Grizzlies and Screens



Diesel Engines

NORDBERG

MACHINERY FOR PROCESSING ORES and INDUSTRIAL MINERALS

NEW YORK • SAN FRANCISCO • SPOKANE • WASHINGTON • TORONTO
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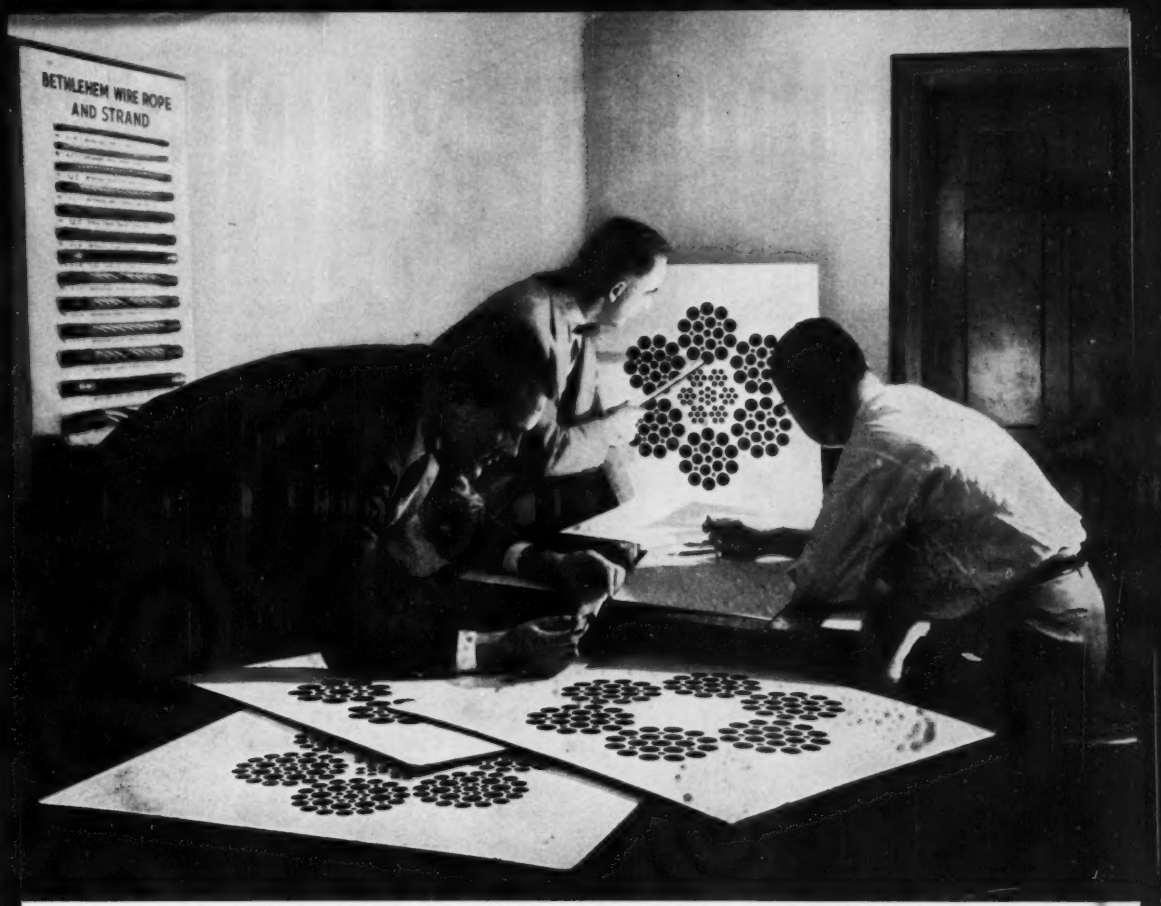



Much of the durability of Bethlehem wire rope can be traced back to the engineer and the drawing-board.

# So that your Wire Rope will serve you well

These engineers are engaged in a typical discussion of the product they live with—Bethlehem wire rope. They know the tremendous importance of good design, good engineering . . . and they will spend many hours, sometimes days, over a seemingly small point that they feel will improve the quality of Bethlehem rope.

The making of wire rope is more than a matter of drawing wire and laying wires and strands into intricate patterns. Wire rope starts in the minds of engineers, and at Bethlehem these minds are busy ones.

When you rig with Bethlehem rope, you can be sure that the rope has been well designed, well engineered . . . and that every subsequent step has received the same degree of care.

This care pays off on the job, where Bethlehem rope will serve you well. You can depend upon every foot, every inch of it, no matter how tough the going.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

*On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation*

***When you think WIRE ROPE . . . think BETHLEHEM***

# BILLITON MINES

## 3 LeTourneau Rear-Dump Haulers perform so well in South American mine that owner brings in 6 more

Deep in the tropical jungles of Surinam, Billiton Mines of Paramaribo operates an extensive bauxite pit and mill 24 hours a day, the year around. They are stripping clay overburden from ore deposits and hauling bauxite rock to crusher.

On this multi-handling work, Billiton Mines had always hauled both their overburden and pit ore in shovel-loaded, narrow-gauge rail cars. Last winter, however, to maintain profitable output as operations were extended into new areas where haul grades were steeper, they turned to LeTourneau rubber-tired, rear-dump Tournarockers. These rear-dump trucks easily climb the 10% slopes which the locomotives could not negotiate, and, despite extreme equatorial heat and very heavy rains (120 inches annually), keep production on schedule.

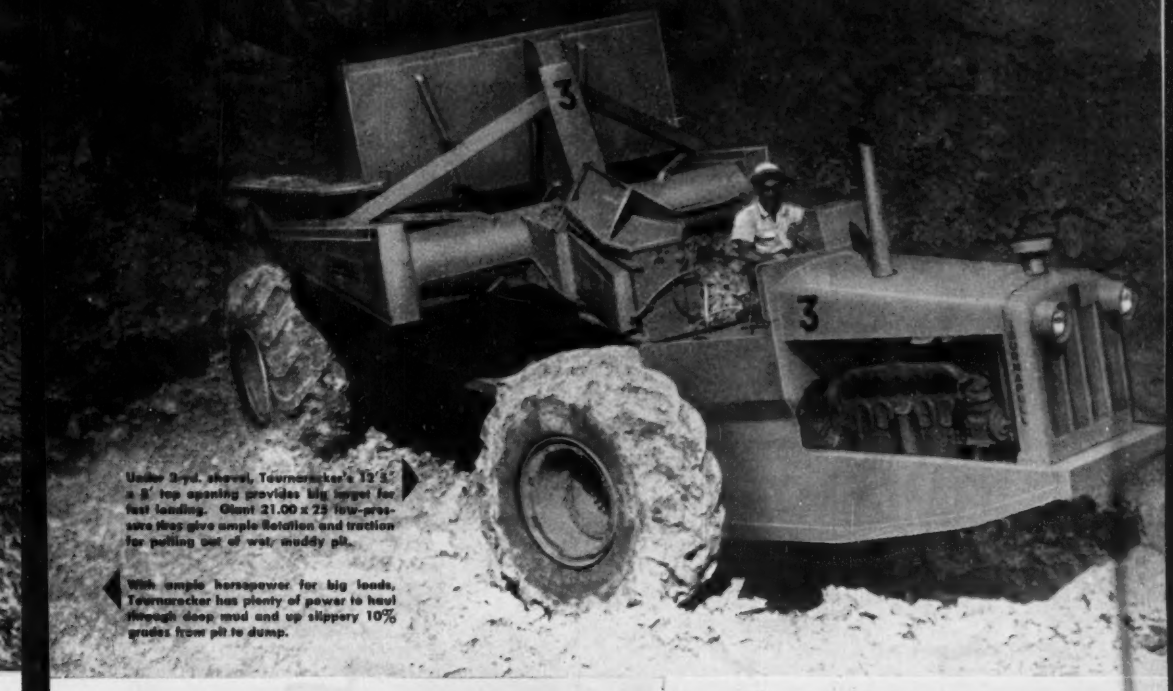
### 1500-ft. cycle every 6 minutes

When these photos were taken, Billiton Mines was using 3 of these 16-ton, rear-dump haul units to remove 20 feet of heavy, wet clay overburden. Shovel-loaded, each Tournarocker carried 15 cu. yds. per trip — made 10 trips an hour on 750 ft. one-way haul up 10% grades. That's 150 cu. yds. per unit per

R. G. LeTOURNEAU, INC.

HIGH-SPEED, RUBBER-TIRED HAULING • EXCAVATING

# triples Tournarocker fleet



Under 3-yd. shovel, Tournarocker's 12' 8" x 8' top opening provides big target for fast loading. Giant 21.00 x 25 low-pressure tires give ample flotation and traction for pulling out of wet, muddy pit.

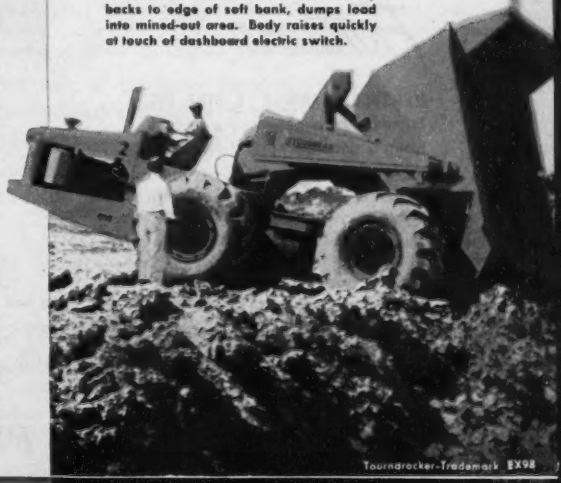
With ample horsepower for big loads, Tournarocker has plenty of power to haul through deep mud and up slippery 10% grades from pit to dump.

hour, and a combined output for the 3 high-speed Tournarockers of 450 cu. yds. hourly.

Performance of these 3 units has been so satisfactory under extremely adverse working conditions that Billiton Mines has added 6 more Tournarockers to their fleet. Upon completion of stripping, the 9 units will haul bauxite ore 1 mile from pit to mill.

Whether you are moving clay, gravel or rock, this advanced earthmoving equipment can mean lower costs and increased production on *your* mining operations, too. Tournarockers are available in 9, 18, 35 and 50-ton sizes. Your nearest LeTourneau Distributor will be glad to give you all the facts on these highly mobile rear dumps. Call him, or write today.

Front-wheel-drive Tournarocker safely backs to edge of soft bank, dumps load into mined-out area. Body raises quickly at touch of dashboard electric switch.



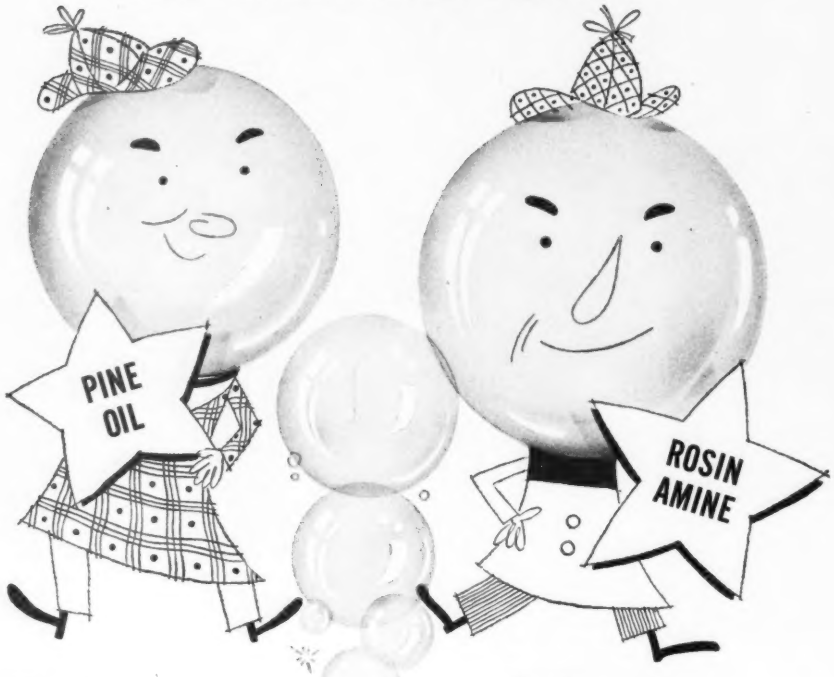
Tournarocker-Trademark EX98

**PEORIA, ILLINOIS**

● **LIFTING EQUIPMENT**

# Use these "Agents"

## FOR BEST RECOVERIES




### *Frothers*

**HERCULES YARMOR® F PINE OIL**
Standard of quality among pine oil frothers since the early days of flotation. Yarmor F Pine Oil produces a strong froth of good volume, satisfactory texture, and excellent cell-life stability.

### *Collectors*

**RADA (Hercules Rosin Amine D Acetate)**
Siliceous mineral collector that has good solubility and handles easily.

Rosin Amine Derivatives: Special purpose collectors; uses vary with type of materials to be floated.

*Technical information on these and other flotation aids is available. Send for 16-page booklet "Flotation and Hercules Flotation Agents."*

*HERCULES Flotation Agents*

*HERCULES POWDER COMPANY* Naval Stores Department, 933 King Street, Wilmington 99, Delaware

NM52-1

# MANCHA'S LITTLE TRAMMER

**Operating wt., 1½ tons**

## *Earns* MORE . . . BECAUSE IT *saves* MORE

**SAVES MAN-POWER**
This powerful little storage battery locomotive does the work of a whole crew of hand trammers, and releases men for profitable labor.

**SAVES TIME – CUTS LABOR COSTS**
Payroll savings effected by the use of Mancha's Little Trammer are often enough to write off the cost of this locomotive in a very short time, because it not only hauls ore but can also be used to handle mine supplies.

**SAVES MAINTENANCE EXPENSE**
Years of development and perfecting in actual mine service have made Mancha's Little Trammer virtually trouble-free. Simple design, rugged construction make inspection easy, repair seldom necessary.

**Important savings are assured, too, through the use of genuine Mancha replacement parts for the Little Trammer – or any Mancha Storage Battery Locomotive. Mancha-made parts meet rigid standards for fit, material, and workmanship. There is no variation. Their use is your guarantee of quick installation and continued long life.**

### Will a Mancha's Little Trammer pay in your mine?

You can find out easily and quickly. Send in the coupon for our "mine haulage data form." With the information you furnish, we can tell you how a Little Trammer can help you save money. So, whether or not you are in the market today, send the coupon and get valuable haulage data you can use now or tomorrow. There's no obligation.

**Mancha Storage Battery Locomotive**
*Division GOODMAN Manufacturing Company*
**4850 South Halsted Street, Chicago 9, Ill., U.S.A.**
E & MJ - 652
Send your mine haulage data form.

NAME _____

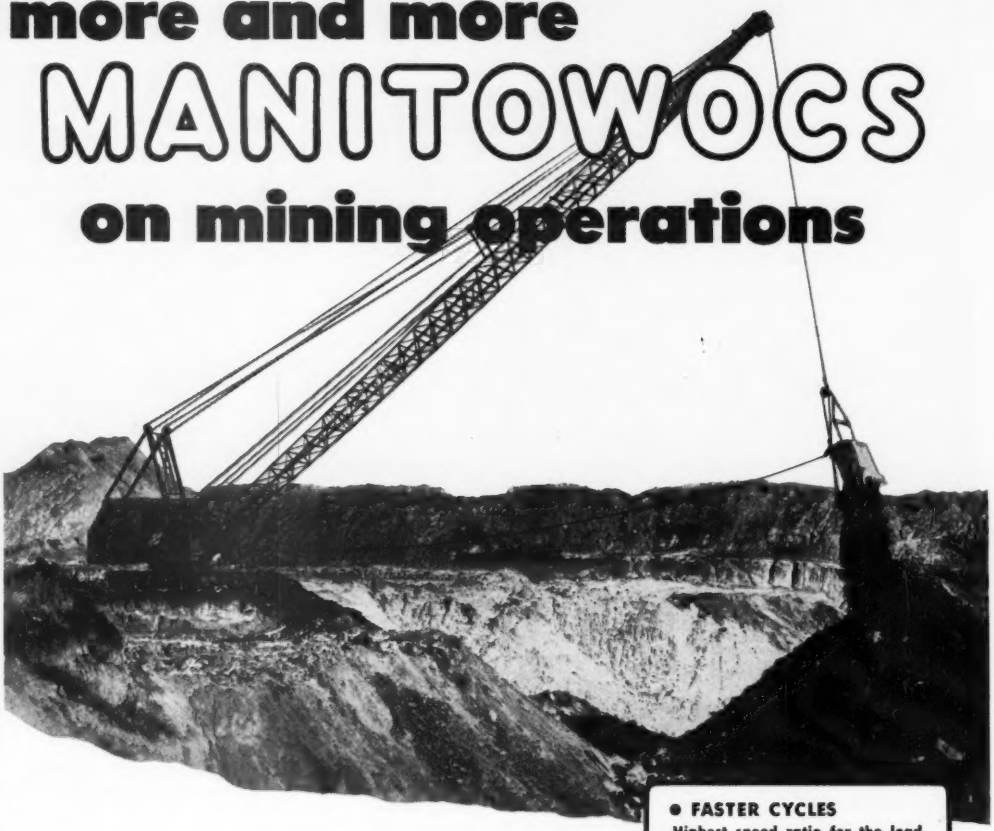
FIRM _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

**MANCHA STORAGE BATTERY LOCOMOTIVE**
*Division* **GOODMAN** *Manufacturing Company*
4850 SOUTH HALSTED STREET CHICAGO 9, ILL., U. S. A.

# more and more MANITOWOCS on mining operations



There's a big swing to Manitowoc excavators on every phase of mining — from stripping to loading — because Manitowocs are built for these jobs — with special long-reach dragline booms; long "hi-lift" shovels; large, wide crawlers; built-in stability — all the factors that contribute to big, steady output.

From the Mesabi Iron Range, to the coal fields of Pennsylvania, Manitowocs are becoming first choice of the experienced operators—those who've tried them all are switching to Manitowocs, and the repeat orders reveal their satisfactory performance. Before you buy your next machine, get complete details on Manitowoc Mining Shovels, Cranes, and Draglines. Manitowoc Engineering Works, Manitowoc, Wisconsin.

- **FASTER CYCLES**
  Highest speed ratio for the load, automatically selected. Speeds increased as much as 25% with complete safety for machine and operator.
- **FULL ENGINE POWER**
  Engine never lugged down below full speed load — Converter boosts torque, increases bail pull, without pulling down engine speed.

**THE TORQUE CONVERTER makes the difference**

- **ABSORBS SHOCK**
  Oil cushion absorbs shock loads . . . reduces machine breakage, assures longer parts life and less down time for maintenance.

MANITOWOC Speedcrane

SHOVELS 1-5 YD. CRANES 18-100 TON

Whether you want one worm gear speed reducer or a thousand, a standard drive or a unit designed to meet special problems . . . Cleveland is always at your service.

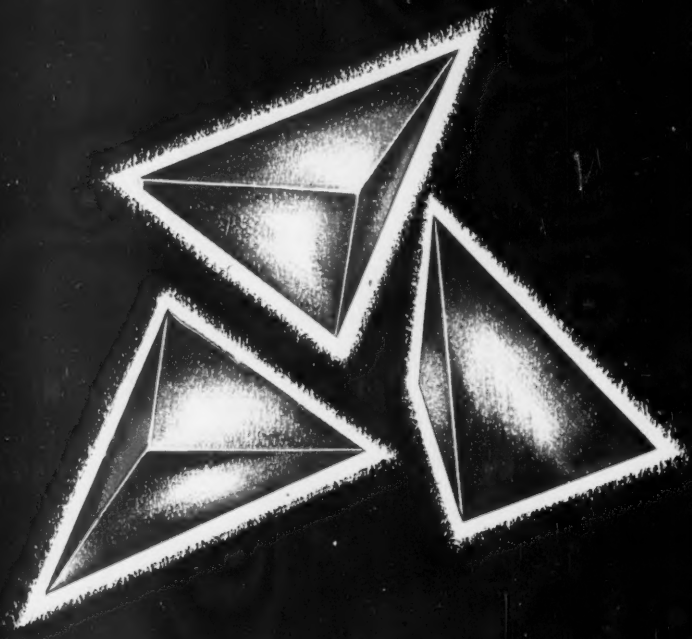
# Dependability—Cleveland ingredient beyond price

● It is not surprising that Cleveland drives installed 35 years and more ago are still in service. Units built in the early years of the Company's history continue to operate dependably today with minimum attention.

There are reasons for the outstanding performance that is synonymous with the name Cleveland. From its start in 1912, this Company concentrated its entire engineering and manufacturing effort on the worm gear drive. It has always emphasized four factors—correctness of design, finest quality materials, up-to-date manufacturing facilities and precision workmanship. As a result, the durability, performance and efficiency of worm gearing have been raised to new heights. The worm gear drive—and Cleveland in particular—affords measurable savings—in life-time cost, in low maintenance and in lasting satisfaction.

Write for the new Cleveland Catalog for specifications and other details of the complete Cleveland line. The Cleveland Worm & Gear Company, 3252 East 80th Street, Cleveland 4, Ohio.

*Affiliate: The Farval Corporation, Centralized Systems of Lubrication. In Canada: Peacock Brothers Limited.*



## ATOMIC SCIENTIST No. 1 DID US ALL A GOOD TURN

Nature, the original atomic scientist, created in the diamond one of her great masterpieces.

In finer industrial qualities the atoms are arranged in tetrahedral form and billions of them are compacted in even the tiniest diamond crystal. They form the hardest substance known to man, long prized as the supreme cutting medium.

Other diamond structures are often agglomerate; a sort of mineral pudding of diamond atoms in various crystalline arrangements, excellent in many applications but without the peculiar atomic structure which gives the selected diamond its incomparable cutting power.

The diamonds used in Truco diamond drill bits have always been selected with due observance of their individual characteristics—and set with their "best side toward the work."

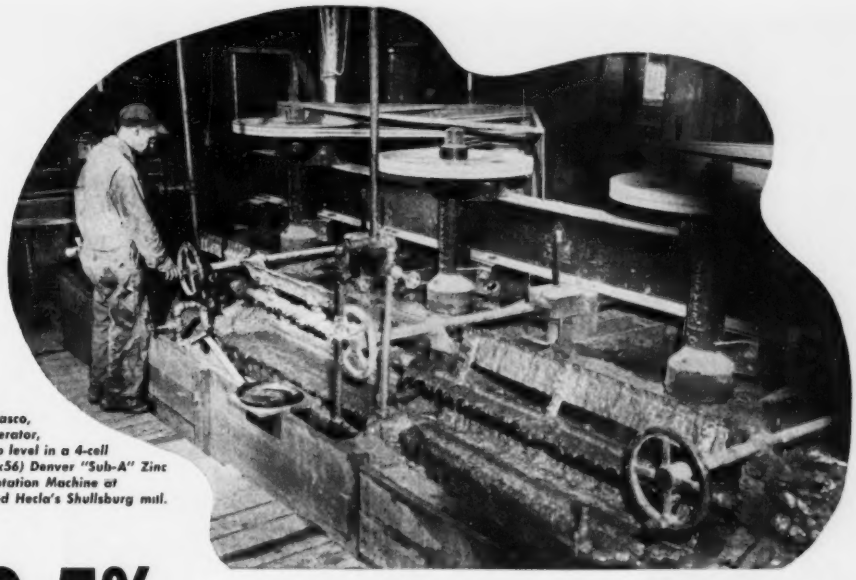
Their superior performance in the field follows as a matter of simple logic.

**WHEEL TRUEING TOOL COMPANY**

3200 W. DAVISON AVENUE, DETROIT 6, MICHIGAN

**WHEEL TRUEING TOOL CO. OF CANADA, LTD.**

575 LANGLOIS AVENUE, WINDSOR, ONTARIO, CANADA



*Thomas E. Pasco, flotation operator, adjusts pulp level in a 4-cell No. 30 (56x56) Denver "Sub-A" Zinc Rougher Flotation Machine at Calumet and Hecla's Shullsburg mill.*

# 63.5% Grade Zinc Produced By Denver "Sub-A" Makes GREATER PROFITS for Calumet & Hecla...

Calumet and Hecla Consolidated Copper Company, Shullsburg, Wisconsin, gets a 63.5% Grade Zinc by using Denver "Sub-A" Flotation Machines for *roughing and cleaning*. This premium grade concentrate means greater profit.

You can profit too,—get the complete story of Calumet and Hecla Consolidated Copper Company, Shullsburg plant by writing for the May-June 1951 issue of DECO TREFOIL!

Calumet and Hecla's success is more proof of the additional profits you get with Denver "Sub-A" Flotation Machines. Denver "Sub-A" has become the world leader in flotation recovery because these standard machines have the flexibility it takes to meet changing ore conditions. This flexibility gives your flotation engineer the tools he needs to get the results that pay greatest profits to you.

Write, wire or phone for information on how you can get more from your ore with Denver "Sub-A", as Calumet and Hecla has done.

**Denver "Sub-A" Zinc Flotation**

| | |
|---|---|
| Heads | 9.49% Zn |
| Recovery (flotation) | 91.00% |
| Grade | 63.50% Zn |
| Tails | 0.20% Zn |
| Tonnage (concentrator feed) | 1200 Ton/24 hr. |

**COMPLETE MILL EQUIPMENT...from testing to feeder to dryer**

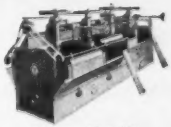
*Denver Ore Testing Service*

*Denver Jaw Crushers*

*Denver-Dillon Vibrating Screens*

*Denver Vertical Sand Pump*

*Denver Steel-Head Ball Mills*



*Denver "Sub-A" Flotation Machine*

*Denver SRL Pumps*

**Our 25th Year of Flotation Engineering**

**DENVER EQUIPMENT COMPANY** . 1400 17th Street • Denver 17, Colorado

GIDDYUP! WHOA! BACK UP!
*This was one way of bringing ore to the surface back around 1890. Three men and two horses—and a mighty small bucket!*

An enlargement of this photo suitable for framing is yours for the asking.

# Times Have Changed...

## Horse-drawn blasting practices are out-of-date, too!

Fantastic, isn't it, that primitive methods of mining such as the horse-drawn hoist could ever have shown a profit.

But it's equally fantastic that some mine operators who wouldn't think of having anything but the latest mechanical equipment forget that blasting practices also must be kept up to date.

The milli-second delay blasting technique developed by Atlas in the ROCKMASTER Blasting System has practically revolutionized theories of explosives action. ROCKMASTER makes the most of explosives energy . . . gives control over breakage, throw, noise and vibration never before possible. And sizeable reductions in explosives load and number of holes per round!

Send for the free 20-page ROCKMASTER book today to see how times have changed and have made possible really better blasting.

**ATLAS** EXPLOSIVES
*"Everything for Blasting"*

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington 99, Del. • *Offices in principal cities* • *Cable Address—Atpowco*

New carriers, "exactly the same as originally furnished," were ordered by the owners when planning an extension to their conveyor system. The 60" wide conveyor, which has moved over 90 million tons of crushed and screened ore, is equipped with S-A Style No. 444 live shaft, heavy duty carriers.

# S-A CONVEYING Systems

## for Heavy Duty **ORE HANDLING**— **ALWAYS** at Lowest Cost per Ton

- Belt Conveyors
- Belt Trippers
- Belt, Pan & Plate Feeders
- "AMSCO" Steel Pan Feeders
- Ship Loading Boom Conveyors
- Stacking Conveyors
- Storage & Reclaiming Systems
- Flight & Chain Conveyors
- Screw Conveyors
- "Natural Frequency" Vibrating Conveyors
- REDLER Conveyor-Elevators
- ZIPPER Conveyor-Elevators
- Conveyor Belt Cleaners
- Headshaft Holdbacks
- Grizzlies & Screens
- Centrifugal Pilers
- Bin Gates & Tunnel Gates
- Car Pullers & Spotters
- Hoists & Winches
- Bucket Elevators
- Skip Hoists
- SEALMASTER Ball Bearing Units

*Write for a bulletin on any of the above.*

S-A bulk materials handling equipment has cut costs and provided efficient handling in scores of ore mining and processing installations. That's why, over and over again, owners have re-ordered S-A equipment for extensions and enlargements of their ore handling facilities.

During its more than 50 years in the bulk materials handling field, Stephens-Adamson has developed a complete line of equipment and an experienced engineering staff. This combination of men and equipment enables S-A to design and build conveying systems that will move your materials at the lowest cost per ton. Write for details today.

STEPHEN S-A DAMSON MFG. CO.

4 Ridgeway Avenue, Aurora, Illinois — Los Angeles, Calif., Belleville, Ontario

**DESIGNERS AND MANUFACTURERS OF ALL TYPES OF BULK MATERIALS HANDLING EQUIPMENT**

*To insure* lowest cost per yard moved, or ton lifted . . . compare all excavator and crane information with "KOEHRING WORK CAPACITY". Your Koehring distributor has specific figures that will let you prove for yourself the biggest profit-earning value. K124

KOEHRING HEAVY DUTY

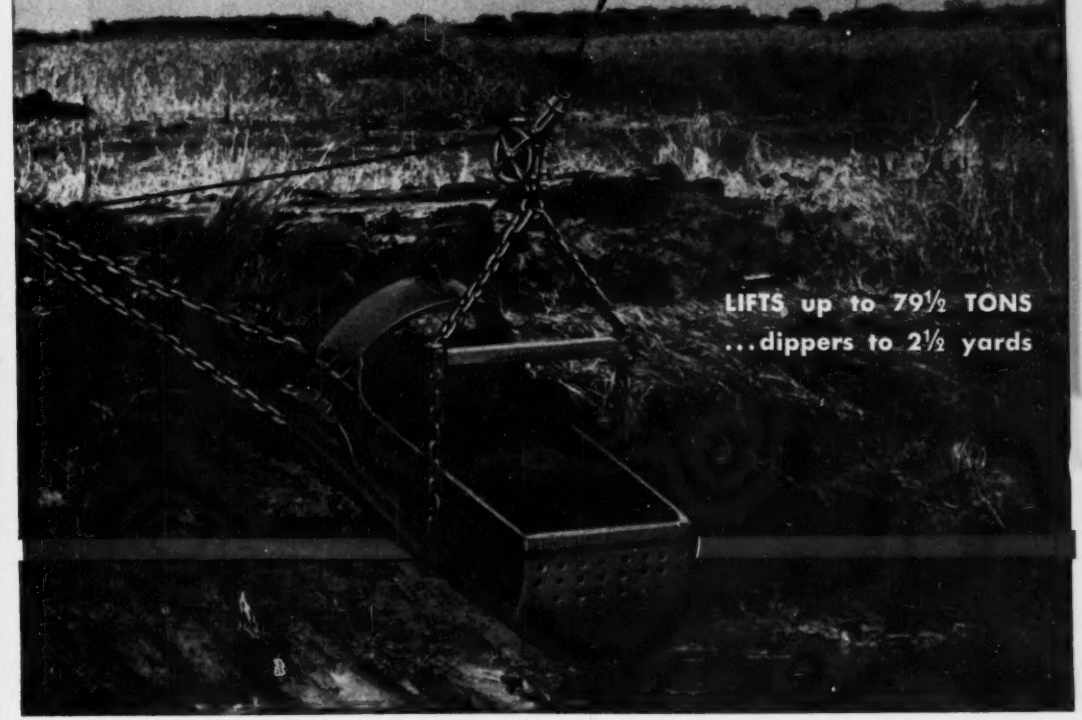
KOEHRING COMPANY
Milwaukee 16, Wis.

*Subsidiaries:* PARSONS • JOHNSON • KWIK-MIX

*Measure by*

# KOEHRING WORK CAPACITY"

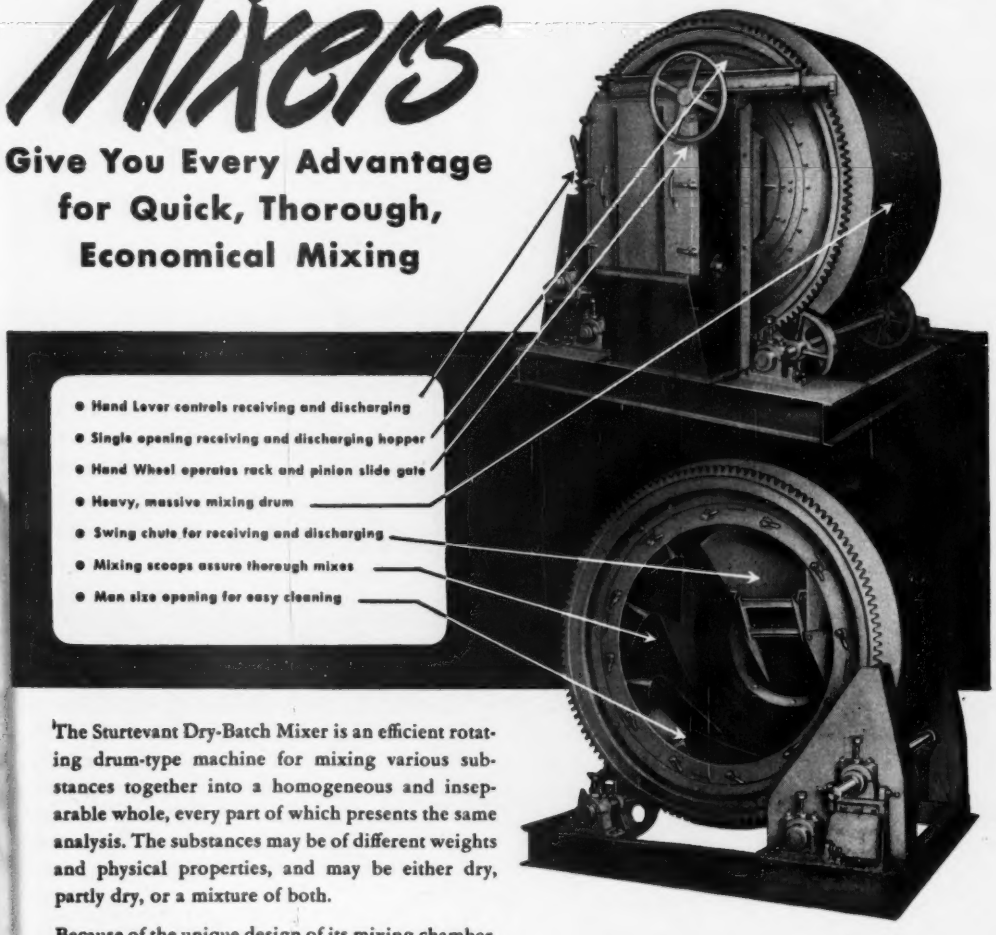
*when you compare shovels and cranes*



# Sturtevant Dry Batch

# Mixers

## Give You Every Advantage for Quick, Thorough, Economical Mixing


• Hand Lever controls receiving and discharging
• Single opening receiving and discharging hopper
• Hand Wheel operates rack and pinion slide gate
• Heavy, massive mixing drum
• Swing chute for receiving and discharging
• Mixing scoops assure thorough mixes
• Man size opening for easy cleaning

The Sturtevant Dry-Batch Mixer is an efficient rotating drum-type machine for mixing various substances together into a homogeneous and inseparable whole, every part of which presents the same analysis. The substances may be of different weights and physical properties, and may be either dry, partly dry, or a mixture of both.

Because of the unique design of its mixing chamber, and the 4-way mixing action which brings two or more substances together, the Sturtevant Dry-Batch Mixer does a more rapid mixing job than other machines and, at the same time, it is complete and thorough in every particular.

Write for bulletin today.

### *Compare These Advantages*

- Only one lever controls both receiving and discharging for simplicity of operation. Hand wheel operates rack and pinion slide at feed opening.
- 4-way mixing action speeds production...assures thorough blends.
- "Open-door" accessibility permits easy, fast, thorough, cleaning.
- Single aperture drum for both intake and discharge.
- Unusually efficient scoops pick up materials to effect thorough mixing as drum revolves.
- 5 models . . . a size for every mixing job . . . smallest size mixes up to 7½ tons per hour . . . largest size up to 75 tons per hour.

## STURTEVANT MILL COMPANY

**101 Clayton Street, Boston 22, Mass.**

*Designers and Manufacturers of:*

CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS
ELEVATORS • MIXERS
MECHANICAL DENS and EXCAVATORS

# ABOVE ALL...
# A SLING
## MUST BE SAFE!

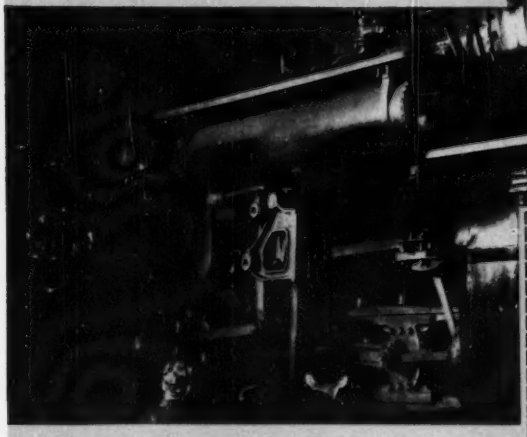
● You wouldn't trade places with the men in this picture unless you had utmost confidence in the wire rope sling.

Naturally you want to move loads easily at lowest possible cost, but neither of these advantages need be sacrificed for safety when you standardize on American Tiger Wire Rope Slings.

Your job is probably different—but we make different slings, too—enough types and varieties to fit the 430 applications listed in our "Tiger Sling" Book. If you get a copy of this book, and don't find the slings you need, tell us about it and our engineers will work out a special design for your own use.

For greatest strength American Tiger Slings are made from Monitor Improved Plow Steel Wire Rope. Fittings are specially heat-treated carbon steel for superior toughness.

By using the *right* sling for your job, you can get many times the service life you get from makeshift slings. And above all you get safety! Send the coupon.



American Steel & Wire
842 Rockefeller Building
Cleveland 13, Ohio

Please send me your free book on American Tiger Wire Rope Slings.

Name.....

Company.....

Address.....

City.....State.....

AMERICAN STEEL & WIRE DIVISION
UNITED STATES STEEL COMPANY, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO · IN THE SOUTH—TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

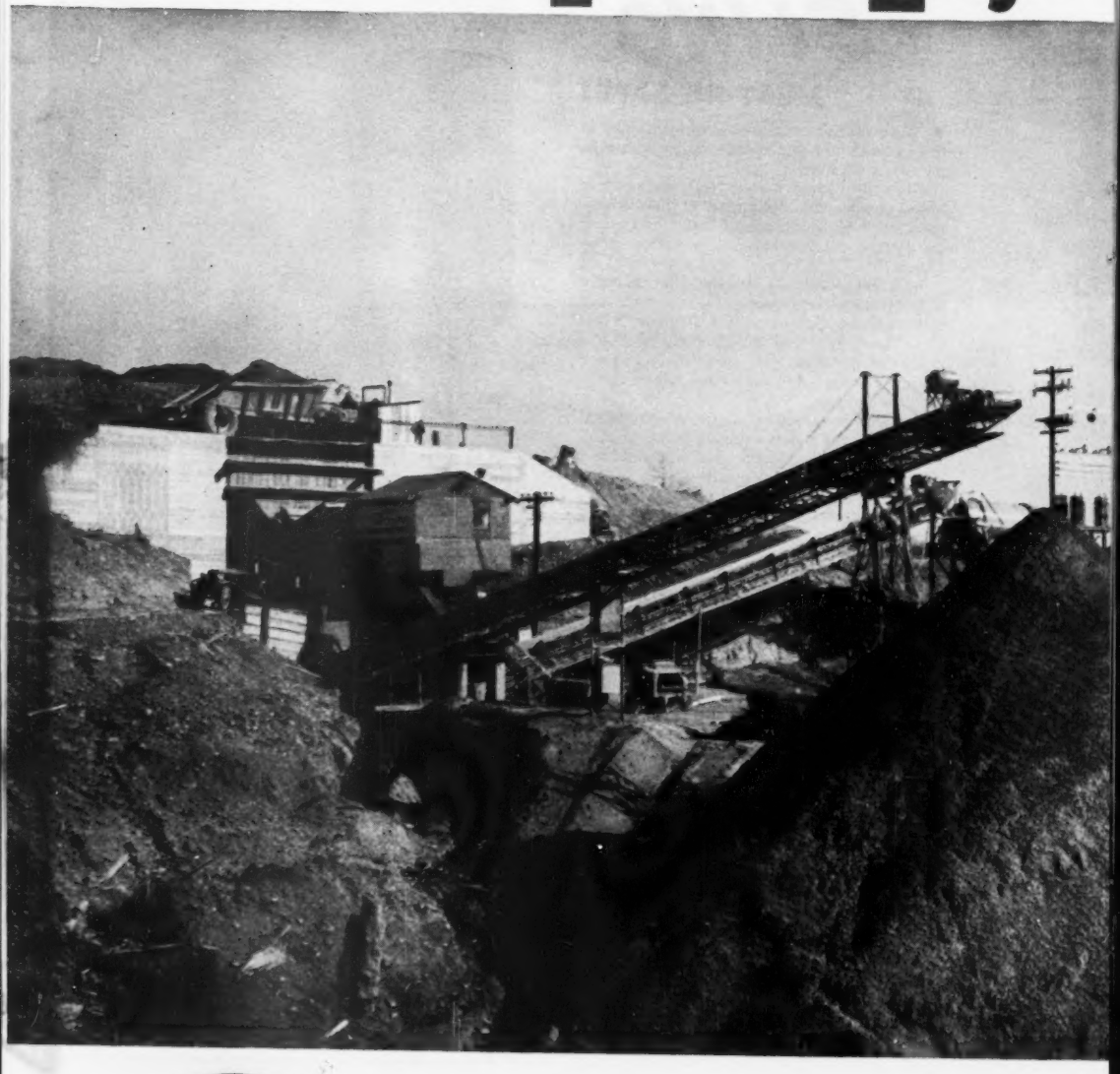
USS

# U·S·S AMERICAN TIGER WIRE ROPE SLINGS

UNITED STATES STEEL

***When your operating margin is narrow...***

# that Pioneer Edge



**BUY BOTH!**
HIGHER OUTPUT
LOWER UPKEEP

# Pioneer

*Continuflo* **EQUIPMENT**

# makes profit more certain

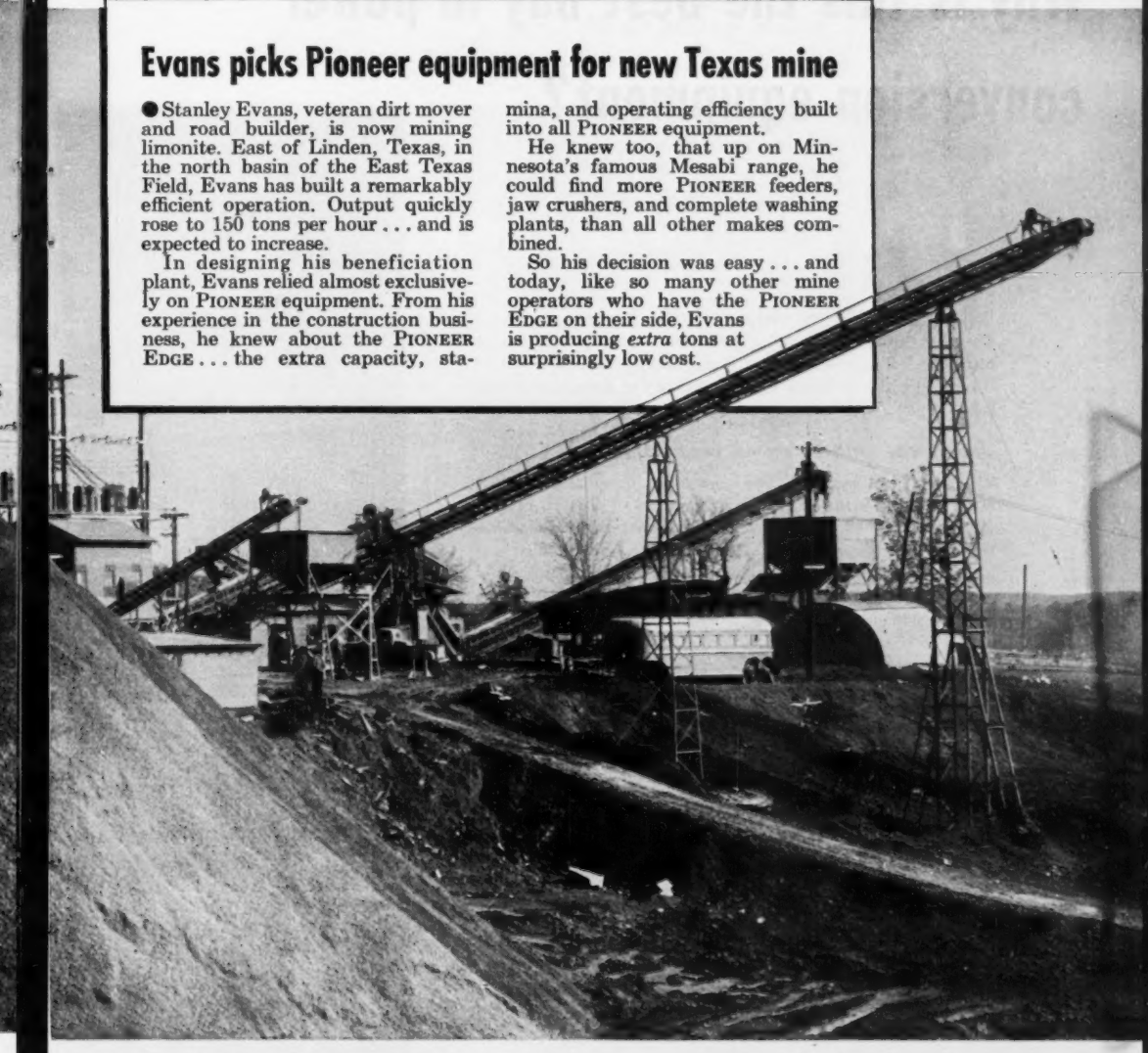
## Evans picks Pioneer equipment for new Texas mine

● Stanley Evans, veteran dirt mover and road builder, is now mining limonite. East of Linden, Texas, in the north basin of the East Texas Field, Evans has built a remarkably efficient operation. Output quickly rose to 150 tons per hour . . . and is expected to increase.

In designing his beneficiation plant, Evans relied almost exclusively on PIONEER equipment. From his experience in the construction business, he knew about the PIONEER EDGE . . . the extra capacity, stamina, and operating efficiency built into all PIONEER equipment.

He knew too, that up on Minnesota's famous Mesabi range, he could find more PIONEER feeders, jaw crushers, and complete washing plants, than all other makes combined.

So his decision was easy . . . and today, like so many other mine operators who have the PIONEER EDGE on their side, Evans is producing *extra* tons at surprisingly low cost.



### These Pioneer Units Keep Costs Low for Evans

Beneficiation plant at the S. E. Evans Construction Company mine (shown above) was designed by George Hawkins, Evans production manager. It includes the following Pioneer units.

- 5′ x 12′ MESABI VIBRATING SCREEN
- 30″ x 42″ JAW CRUSHER
- 3 4′ x 12′ 3-DECK VIBRATING SCREENS
- 4′ x 8′ VIBRATING SCREEN
- 72″ x 16′ SCRUBBER
- 40″ x 22″ TRIPLE ROLL CRUSHER
- MISCELLANEOUS CONVEYORS AND HOPPERS

**PIONEER ENGINEERING WORKS**
1515 Central Avenue • Minneapolis 13, Minnesota
(SUBSIDIARY OF POOR & COMPANY • CHICAGO)

● Please send me information on the equipment checked.

| | | |
|---|---|---|
| ☐ JAW CRUSHERS | ☐ WASHING PLANTS | ☐ MECHANICAL FEEDERS |
| ☐ ROLL CRUSHERS | ☐ BITUMINOUS PLANTS | ☐ VIBRATING SCREENS |
| ☐ ROCK PLANTS | ☐ APRON FEEDERS | ☐ BUZZER SCREENS (LIGHT DUTY) |
| ☐ GRAVEL PLANTS | ☐ ORO FEEDERS | ☐ CONTINUFLO CONVEYORS |

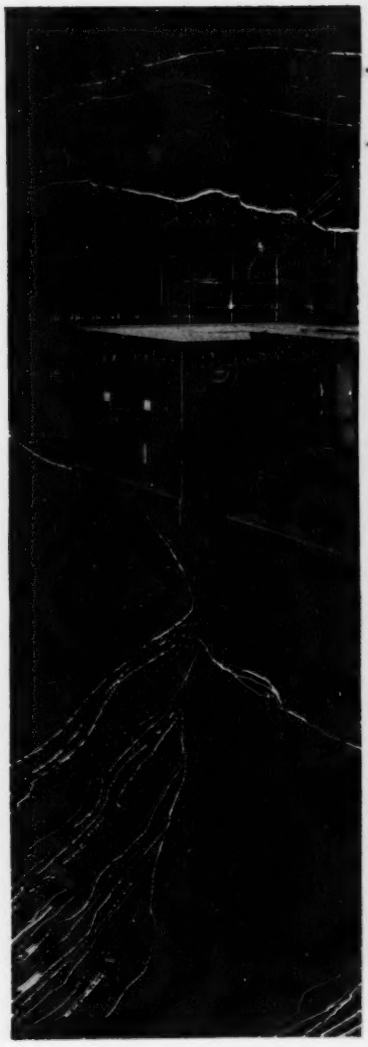
*Name*_____

*Company*_____

*Address*_____

*City*_____ *Zone*____ *State*_____

# Why is this the best buy in power conversion equipment?



When Westinghouse delivered this portable Ignitron Rectifier Substation it came complete . . . mounted in three mine cars. There was nothing else to engineer or buy. All the mine did was hook up the end car to the a-c line and take off the d-c at the other end.

### *Unit gives uninterrupted production*

Westinghouse Ignitron units have an unequaled service record in the mining industry. Since 1937 they've racked up a total of 15,000 years of accumulated service. One Western mine reports: "Our experience with a Westinghouse Ignitron Rectifier Substation has been highly satisfactory. The installation is unattended. It cuts out on shorts then cuts back in again. An electrician visits it every two weeks to clean and inspect contact points. There has been no other maintenance cost. We have never had to renew a tube during a million and a half tons of production."

### *Fast Westinghouse service in all locations*

But if they ever should need service, Westinghouse can provide it—FAST. We have repair plants near all mining districts. Renewal tubes and parts are carried in 24 warehouses throughout the country. Highly skilled field engineers are on call at 37 locations. You're *always* near skilled Westinghouse service.

### *Call Westinghouse early on every job*

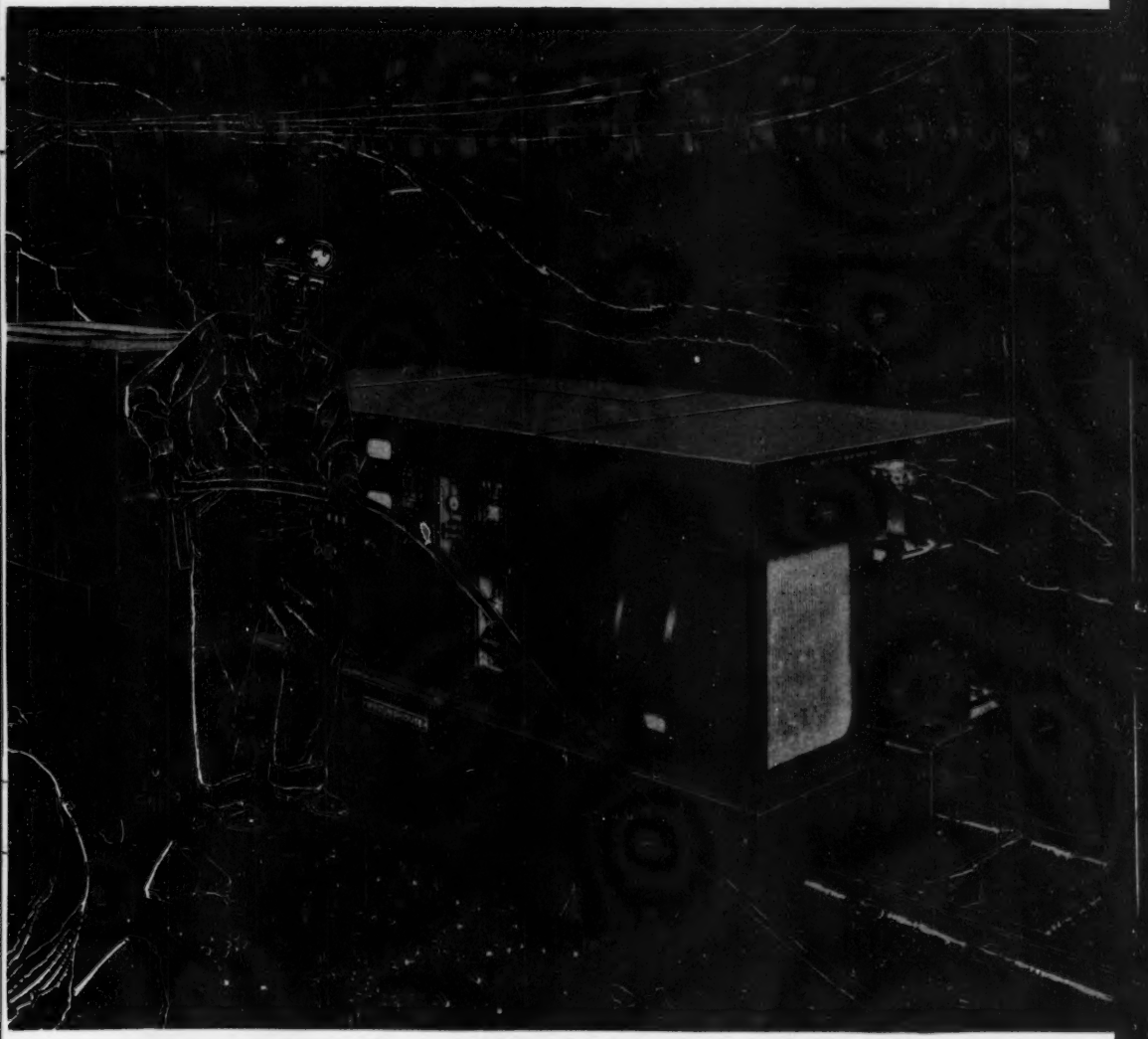
The Ignitron Rectifier Substation is an outstanding example of Westinghouse developments for the mining industry. We make a *complete* line of electrical equipment for mining service. Next time you need electrical equipment, call your nearby Westinghouse office. Westinghouse Electric Corp., Box 868, Pittsburgh 30, Penna. J-94924

YOU CAN BE SURE...IF IT'S

Westinghouse

EQUIPMENT FOR MINING

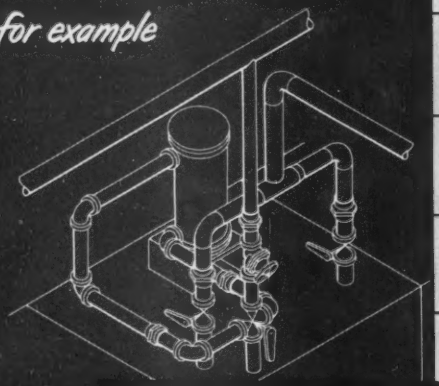
***They did what you can do to produce more***



The Westinghouse Ignitron Rectifier Substation is available as a portable unit like that shown above, or in compact stationary cabinets for permanent installations.

# Are Your Valves Behaving This Well?

...on River Water, for example



THE INSTALLATION

Crane Iron Body Diaphragm Valves on hydraulic lines to cylinder operators on ash pit gates; Southwark Station; Philadelphia Electric Company.

## VALVE SERVICE RATINGS

| | |
|---|---|
| SUITABILITY: | Good design for gritty fluid |
| FEATURES: | Neoprene disc insert-resists cutting |
| MAINTENANCE COST: | Making big savings here |
| SERVICE LIFE: | Already 6 to 9 times longer than other valves |
| CORROSION-RESISTANCE: | O.K. no sign of corrosion |
| PRICE: | Better than many ordinary valves |
| AVAILABILITY: | Regular number in Crane line |

## THE HISTORY

Valves were installed in the hydraulic system when the control cocks failed to shut off tight. But like the cocks, conventional valves put in this service didn't stand up. They couldn't handle the abrasive, sandy river water used for hydraulic operators as well as for ash pit sluicing. They leaked badly in 3 to 5 weeks; had to be replaced.

The problem was solved with Crane Iron Body Diaphragm Valves. Installed more than 7 months, there's been no leakage since; no valve trouble of any kind. The Neoprene disc insert and wide, flat seating surfaces in Crane Valves show no effect of abrasion. Their completely sealed bonnet keeps working parts free of grit.

## THE VALVE

In Crane Packless Iron Body Diaphragm Valves, the Neoprene diaphragm acts as bonnet seal only; is not subject to crushing and rapid wear. Separate disc with Neoprene insert shuts off flow even should diaphragm fail. Made unlined or with full Neoprene body lining. Well suited for erosive fluids, sludges, slurries; also for many corrosive services. See your Crane Catalog or call your Crane Representative.

*The Complete Crane Line Meets All Valve Needs. That's Why*

**More Crane Valves Are Used Than Any Other Make!**

# CRANE VALVES

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois

*Branches and Wholesalers Serving All Industrial Areas*

***VALVES • FITTINGS • PIPE • PLUMBING • HEATING***

## Her fingertips imagine the taste

The lady doesn't trust her eyes alone.

The buyer of Multiwalls is in much the same position.

Aside from package design, it's hard to tell one manufacturer's bag from another's simply by looking at it or fingering it.

Put the bags out of sight and you may be able to see many differences.

Men who buy 85 per cent of all Multiwalls consider* these intangibles more important than any other factor when they choose their supplier.

Invariably, these are among the first questions they ask . . .

"Is this company big enough?"

"Do they have a fair allocation policy?"

"Are their prices competitive?"

"Do they respect delivery dates?"

In a nutshell—

"Are they good people to do business with?"

We can't tell you what the answers are when these Multiwall users consider Union. This we do know . . . and the inference is yours to make—

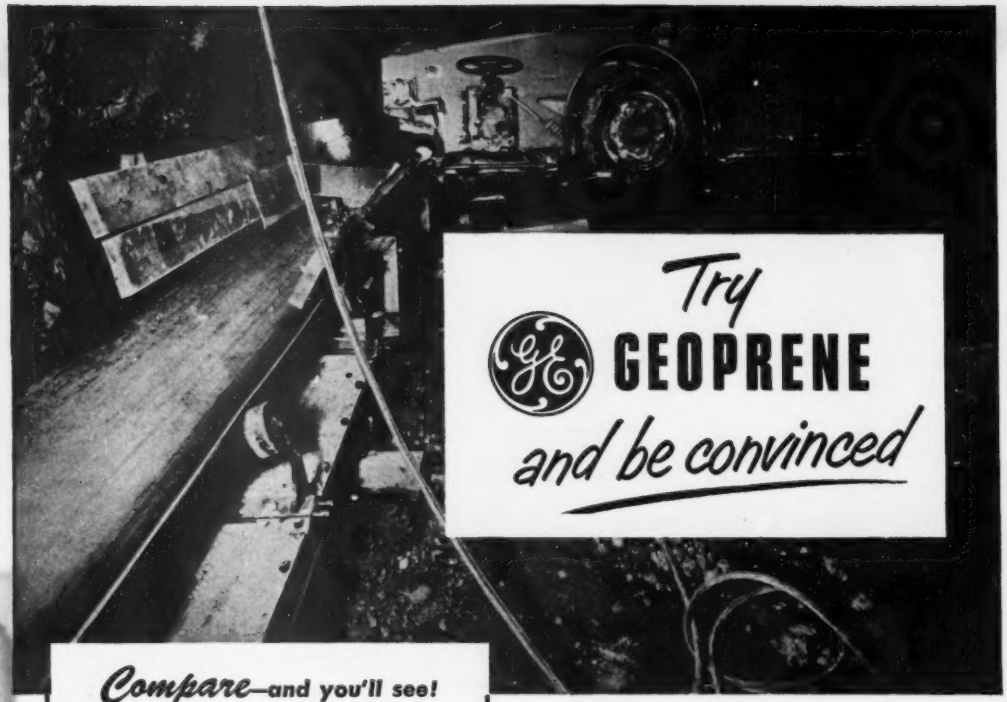
In these days of industrial pressure, when *dependability* is a fervent wish as well as a word, men to whom Multiwalls are important are placing an increasing share of their orders with Union.

More so every day . . .

**IT'S UNION FOR MULTIWALLS**

*August, 1951 research study.

UNION BAG & PAPER CORPORATION • NEW YORK: WOOLWORTH BUILDING • CHICAGO: DAILY NEWS BUILDING




## *Compare*—and you'll see!

These figures, comparing ASTM requirements with typical G-E Geoprene values, indicate at once the superiority of portable cable with Geoprene sheath:

| ORIGINAL | ASTM Requirements | Geoprene Typical Values |
|---|---|---|
| Tensile strength, lb/sq in. | 1800 | 3000 |
| Per cent elongation | 300 | 500 |
| Set in 2-in. test piece, in. | 3/8 | 1/16 |
| After 7 days in Geer oven at 70 C | | |
| Tensile strength, lb/sq in. | 1600 | 2900 |
| Per cent elongation | 250 | 430 |
| After 96 hr in oxygen bomb at 70 C | | |
| Tensile strength, lb/sq in. | 1600 | 2800 |
| Per cent elongation | 250 | 430 |
| After 18 hr in oil at 121 C | | |
| Per cent depreciation in tensile strength | 40 | 35 |
| Per cent depreciation in elongation | 40 | 35 |
| Tear Test | | |
| Tensile strength, min lb/in. | 40† | 75 |

†This is the requirement for rubber jackets; no tear value has yet been set for neoprene-type jacket.

General Electric Wires and Cables

FOR MORE TONS PER MACHINE PER DAY!

General Electric Geoprene portable cable is constructed with a neoprene-based jacket. We know of no tougher, more abrasion-resistant cable jacket. It is highly resistant to oils, acids, alkalies, sunlight, and flame. Try it! Be convinced by your own first-hand experience that you'll get more miles, more hours, more tons of service from a G-E Geoprene cable.

General Electric makes a full line of wires and cables for the mining industry in addition to portable cable, including such cables as varnished-cambric insulated, Super Coronol*, wire-armored, interlocked armor, aerial cables, Flamenol* control wire, magnet wire, and mine telephone cable. A 24-page booklet, *General Electric Wire and Cable for the Mining Industry,* is yours for the asking. Section W17-695, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

*Registered Trade-mark of General Electric Company

*You can put your confidence in—*

GENERAL ELECTRIC

# How concave sides cut V-Belt costs

Important to anyone who wants to cut V-Belt replacement costs is the simple, interesting reason WHY Gates Vulco Ropes are built with *Concave Sides* (U. S. Patent 1813698). See Figure 1.

When a Gates belt is bent around a sheave these Concave Sides fill out to full, even contact with the sides of the sheave groove. (Figure 1A). This gives you sure pulling power. And, naturally, because wear is distributed evenly, the Concave Sides actually give you longer wear—longer belt life. That cuts V-Belt replacement costs.

On the other hand, when a straight sided V-Belt (Figure 2) is bent, the sides bulge out, preventing the belt from fitting evenly in the sheave groove. This causes *extra wear* at the points shown by arrows. (Figure 2A).

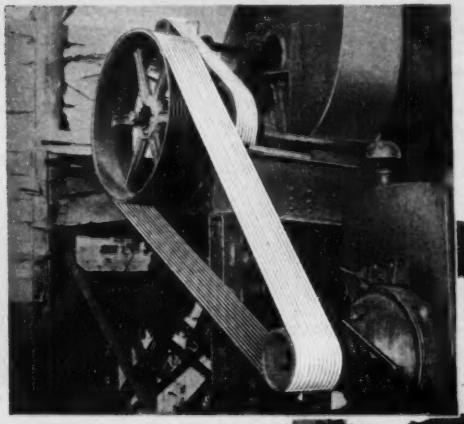
## Make this simple test yourself...

Hold a straight sided V-Belt as it would be bent around a sheave. Take the sides of the belt between your finger and thumb. You can *feel* the bulges in the sides—the bulges that prevent an even fit in the sheave groove and cause extra wear.

Now do the same thing with a Gates Vulco Rope. You can feel the sides fill out. You can see why they press firmly and evenly against the sides of the sheave groove—giving you longer belt life—lower belt costs.

When you buy V-Belts be sure to get Gates Vulco Ropes—the V-Belts with the Concave Sides.

Gates Engineering Offices and Jobber Stocks are located in all industrial centers of the United States and in 71 foreign countries.



### SAVING $600 ANNUALLY

**When these sand drying drums were flat belt driven, heat and dust reduced belt life to as little as two weeks.**

**The Gates Vulco Rope drives that replaced them are saving the Zigler-Cline Construction Co., Fayetteville, North Carolina, more than $600 annually.**

CS-526-B

Gates® VULCO® ROPE DRIVES

THE GATES RUBBER COMPANY • DENVER, U.S.A.

**V-Belts — Hose Molded Rubber Goods for Industry World's Largest Maker of V-Belts**

# *New* BWH V-BELT Installation

## Solves Drive Problem for Gladding McBean

Drive at pug mill of Gladding McBean & Co. Safety guard removed for photographic purposes

**The Problem:**

The drive at the pug mill at the Gladding McBean & Company brick plant, Pittsburg, California, is so vital to their production it cannot be out of service for any length of time. It must operate under dusty conditions which induce slippage in ordinary belts. It must be able to take very severe pulsating loads.

**The Solution:**

With the installation of rugged BWH Bull Dog V-Belts the problems and difficulties were completely overcome.

* * *

Do you have a drive or V-Belt problem? Call us for Bull Dog V-Belts and a space saving, dependable, trouble-free installation.

*Another Quality Product of*

BWH DEPENDABLE RUGGEDNESS

**BOSTON WOVEN HOSE & RUBBER COMPANY**

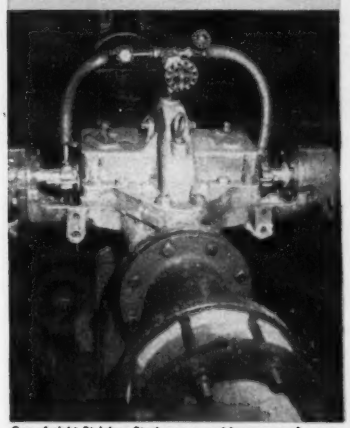
Warehouse Stock: 111 N. Canal St., Chicago, Illinois **Distributors in all Principal Cities**

PLANT: CAMBRIDGE, MASS. • P. O. BOX 1071, BOSTON 3, MASS., U. S. A.

This Stainless Steel clamshell bucket loads moist copper from drying cells into railroad cars for the smelter. It has been in service for six years without need for repair—a constant problem with buckets used previously.

## In recovery of "cement copper" at a large copper mine in the Southwest

# Stainless Steel's corrosion resistance pays off again



One of eight Stainless Steel pumps used in recovery of copper from waste ore at a mine of a large Southwestern copper producer. The pumps have been in use since 1943 and show no sign of wear.

● To meet the tremendous current demand for copper, producers are turning to their waste ore dumps and making use of the "cement copper" process to recover valuable tonnage. To handle the highly acid materials involved, they've found that nothing can equal Stainless Steel.

One of the larger copper producing companies in the Southwest is using eight Stainless Steel single-stage horizontal high-head pumps to move the copper sulphate solution from the bottom of the dump to reaction cells filled with tin cans.

These pumps have been in service since 1943—handling a thousand gallons of the corrosive liquid per minute. Yet today, after nine years' operation, the mine superintendent points out that they still show no sign of wear. Rubber-lined pumps used previously lasted only a few weeks to a few months.

In loading the moist, almost-pure copper from drying cells to railroad cars for transportation to the smelter, Stainless Steel comes into the picture again. The one-yard clamshell bucket is made entirely of Stainless, and it also shows no sign of wear after six years of service. Buckets previously used required constant repair.

There are many spots in your operation—from mine to smelter—where Stainless Steel's resistance to corrosion, abrasion and severe temperatures can reduce maintenance, eliminate shutdowns and raise overall efficiency. Our engineers will be glad to advise you on grades of U·S·S Stainless Steel that best meet the requirements of the application.

UNITED STATES STEEL COMPANY, PITTSBURGH · AMERICAN STEEL & WIRE DIVISION, CLEVELAND · COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH · TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. · UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

## U·S·S STAINLESS STEEL

SHEETS · STRIP · PLATES · BARS · BILLETS · PIPE · TUBES · WIRE · SPECIAL SECTIONS

2-959

UNITED STATES STEEL

# Using the RIGHT Wire Rope for the Job?

You'll get longer service life from wire rope if you do. Here are some points to keep in mind when you're selecting wire rope for any equipment . . .

## STRENGTH

Don't send a boy to do a man's job. Make sure the wire rope you order has enough strength to take care of the maximum load—*plus* a necessary safety factor.

## FLEXIBILITY

If your ropes undergo repeated bending over small sheaves, you'll need a flexible rope with maximum resistance to bending fatigue. Two things increase flexibility—smaller wires and preforming.

## ABRASION RESISTANCE

Lang lay ropes, when properly installed, and constructions with large outer wires will help extend the service life of drag lines and other wire ropes that are subject to severe abrasive wear.

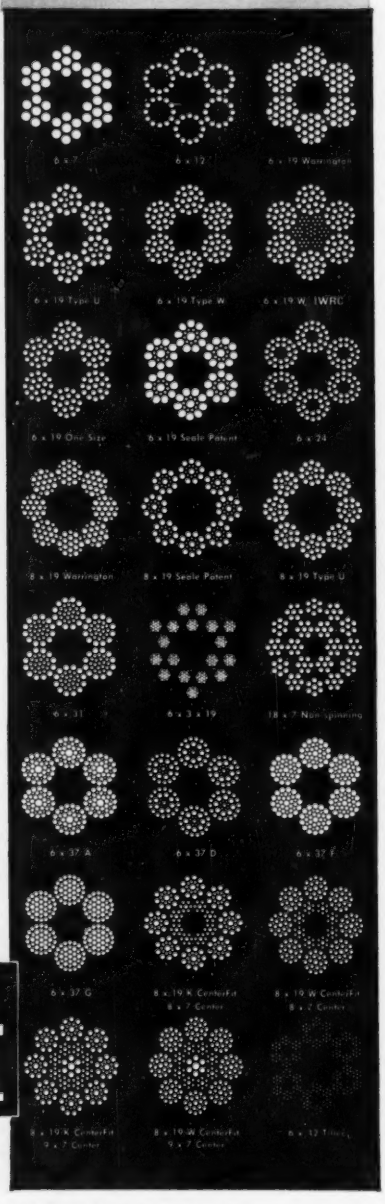
## RESISTANCE TO CRUSHING

An independent wire rope center gives outside strands the support necessary to withstand crushing and distortion—large outer wires help spread the load over a greater area.

When you're looking for ways to cut operating costs, why not enlist the help of your nearest J&L Wire Rope representative? He'll help you select the *right* balance of these wire rope properties to get the longest service life on your specific type of equipment and operating condition.

Through years of research and actual operation in the field, J&L has developed a complete line of wire rope sizes and constructions. You'll find it profitable to cash in *NOW* on J&L experience and manufacturing know-how.

## Select a Wire Rope that Fits Your Equipment Needs


6 x 7
6 x 12
6 x 19 Warrington
6 x 19 Type U
6 x 19 Type W
6 x 19 W, IWRC
6 x 19 One Size
6 x 19 Seale Patent
6 x 24
8 x 19 Warrington
8 x 19 Seale Patent
8 x 19 Type U
6 x 31
6 x 3 x 19
18 x 7 Non-spinning
6 x 37 A
6 x 37 D
6 x 37 F
6 x 37 G
8 x 19 K Contour Fit
8 x 7 Center
8 x 19 W Contour Fit
8 x 7 Center
8 x 19 K Contour Fit
9 x 7 Center
8 x 19 W Contour Fit
9 x 7 Center
6 x 12 Triple

J&L STEEL

JONES & LAUGHLIN STEEL CORPORATION

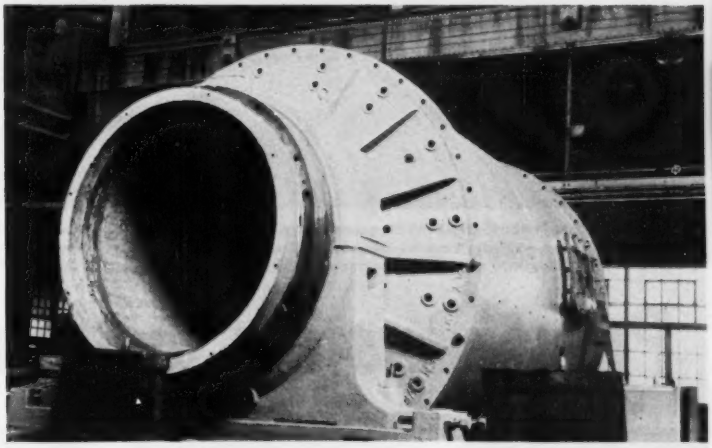
401 Jones & Laughlin Building • Pittsburgh 30, Pennsylvania

## the "low down" on grinding

The Marcy low-pulp-line, rapid-circulation-of-mill-content principle of grinding, thru the use of a grate discharge, was first used 38 years ago.

Its wide acceptance has been proved by the universal use of Marcy Grate Discharge Mills and the many repeat orders received based on output and low-cost-per-ton performance.

*For example:* **LARGE IRON PRODUCER SELECTS 10′ MARCY S FOR TACONITE PILOT PLANT**



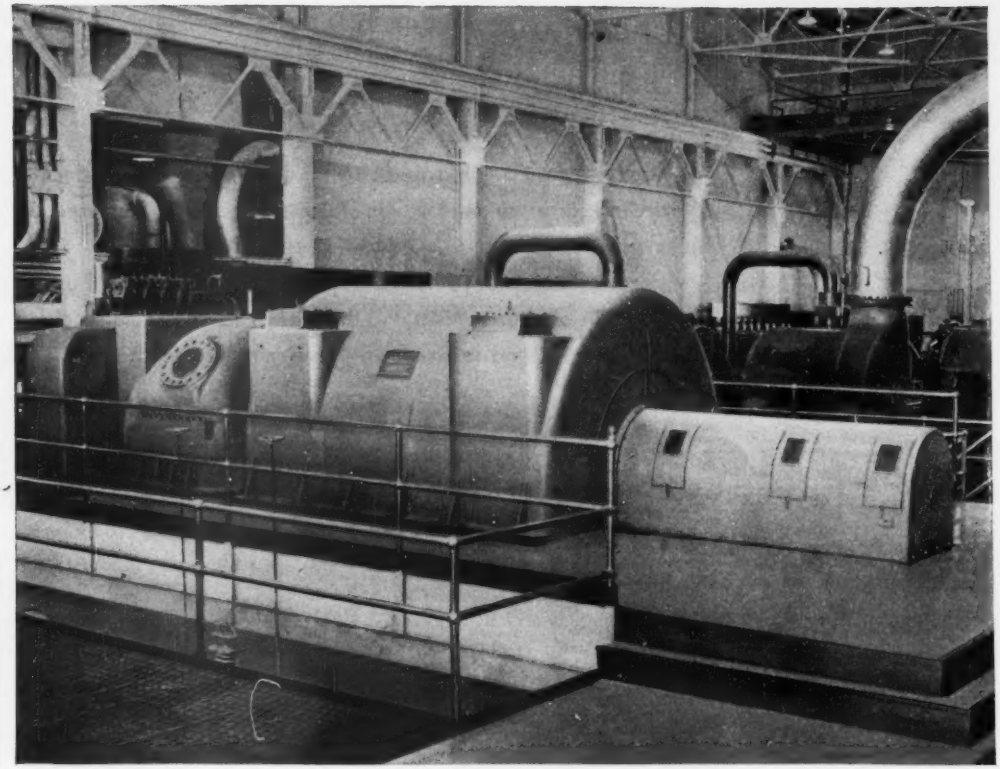
**1 of the 6—10′ dia. Marcy Mills being manufactured for a large iron producer in Minnesota. This taconite pilot plant will use 3—10′ x 14′ Marcy Special Grate Discharge Ball Mills and 3—10′ x 12′ Marcy Open End Rod Mills.**

**Other MASSCO products:** Massco-Fahrenwald Flotation Machines, Genuine Wilfley Tables, Massco-McCarthy Hot Millers, Rock Bit Grinders, Density Controllers, Belt Feeders, Rubber Pinch Valves, Assay and Laboratory Supplies and Equipment, Complete Milling Plants.

**The Mine & Smelter Supply Co.**

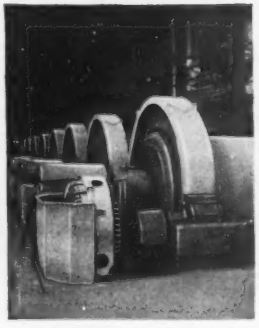
**BOX 5270, TERMINAL ANNEX, DENVER, COLO., U.S.A.**
**OFFICES IN SALT LAKE CITY, EL PASO, 1775 BROADWAY, N. Y. C.**

**REPRESENTATIVES:** CANADIAN VICKERS, LTD., MONTREAL, CAN.; W. R. JUDSON, SANTIAGO, CHILE; THE EDWARD J. NELL CO., MANILA, P.I.; THE AUSTRAL OTIS ENG. CO., LTD., SO. MELBOURNE, AUSTR.; MORGARDSHAMMARS MEK. VERKSTADS AKTIEBOLAG, MORGARDSHAMMAR, SWEDEN; THE ORE & CHEMICAL CORPORATION, 80 BROAD STREET, NEW YORK CITY 4, NEW YORK, REPRESENTATIVES FOR CONTINENTAL EUROPE.

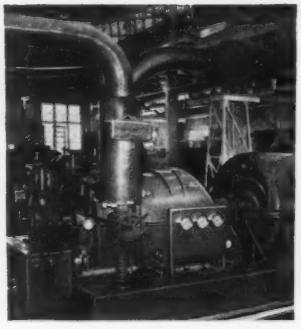


1 **NEW G-E STEAM TURBINE-GENERATOR** generates high-voltage power for this copper company's concentrating and smelting plant. Rated at 10,000 kw, 3600 rpm, the single-stage unit replaces an older 6000-kw unit which generated at 480 volts. Like every G-E turbine-generator, it is custom-built from standard components to meet specific operating conditions.

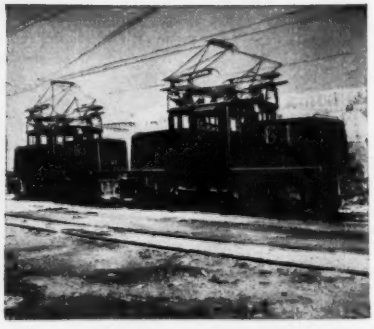
# Power system modernized for



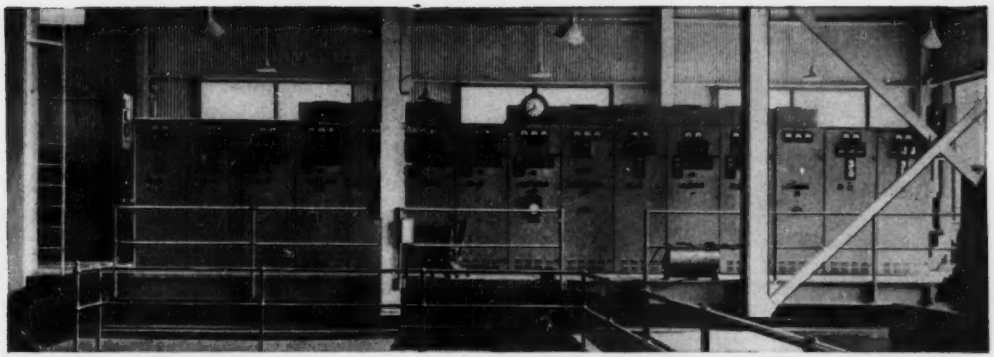
**POWER-FACTOR IMPROVEMENT** is provided by 28 200-hp synchronous motors driving plant's ball mills.



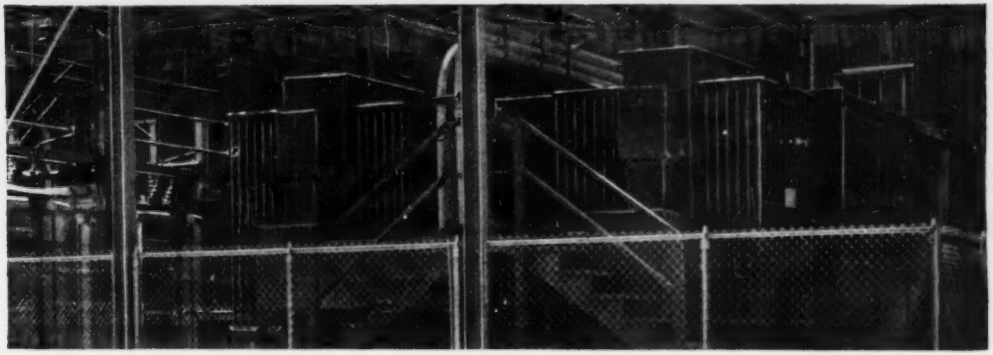
**MECHANICAL POWER** to drive two turbo-blowers is generated from process steam by 1915-hp G-E mechanical-drive turbines.



**LOW-COST HAULAGE** from the copper plant's open pit mine 15 miles away is provided by these two G-E 750-volt 85-ton electric locomotives.



**2** **NEW G-E METAL-CLAD SWITCHGEAR** distributes high-voltage power to load-center substations in electrical load areas. These co-ordinated units are shipped completely assembled and ready for installation. Their compact design saves floor space.



**3** **NEW G-E LOAD-CENTER SUBSTATIONS,** completely metal-enclosed, step down power from primary voltage to 480-v for use in the ball mill area. High voltage power distribution to load centers reduces voltage drop and cuts power losses.

# more efficient distribution

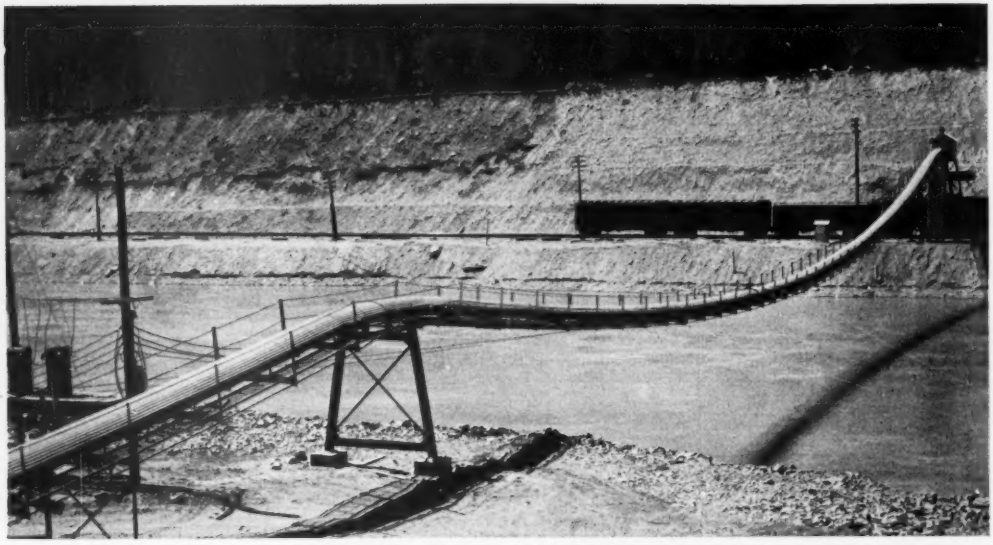
## Copper plant increases capacity by adding G-E turbine, switchgear and load-center substations to existing power system

As part of a continuing modernization program at its concentrating and smelting plant, a large copper company in the Southwest recently installed new General Electric high-voltage power generation and distribution equipment. With these new facilities, power is generated and distributed the modern, high-voltage way. Result: increased protection against shutdowns, lower power-distribution cost.

You, too, can benefit from the kind of G-E application engineering that went into this installation. Call your nearest G-E office and ask for a mining specialist. *General Electric Company, Schenectady 5, New York.* 660-25

**Engineered electric systems for the copper industry**

**GENERAL ELECTRIC**



Here's how to move ore across a river, 100 tons per hour, eliminating a four-mile truck haul. This Link-Belt belt conveyor, 700 ft. long, is mounted on a non-rigid suspension bridge. Vertical gravity-type take-ups keep belt at proper tension.

# Why LINK-BELT belt conveyors are first choice in so many industries . . .

## Engineering experience plus quality components combine to cut handling costs

EFFICIENCY in moving materials makes the difference between profit and loss in many operations. That's why it's so important to make sure you get the *right* belt conveyor system for your needs.

And there's no surer way of meeting your specific operating requirements than by calling in Link-Belt. Our belt conveyor specialists can efficiently engineer the system and recommend the correct components from Link-Belt's complete line of idlers, trippers and terminal machinery. And Link-Belt can match your needs in associated equipment—other types of conveyors, feeders, elevators, car dumpers and shakers.

Equally important, with such a tremendous background in belt conveyor application, Link-Belt is in an ideal position to follow through on every detail of your job—from planning through erection, if desired. One source—one responsibility.

Link-Belt will gladly work with your engineers or consultants. There's a Link-Belt office in the principal city near you.

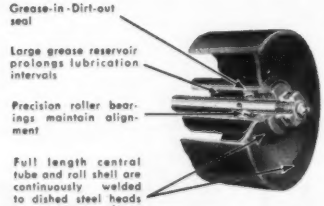
LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, Duluth 2, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa), Sydney (Australia). Offices in Principal Cities. 12,720-A

**LINK-BELT**

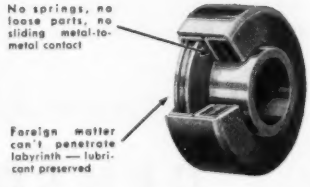
**BELT CONVEYOR EQUIPMENT**

## LINK-BELT Roller Bearing Idlers provide free-rolling, long life

Standard for industry—L-B "100" Idler

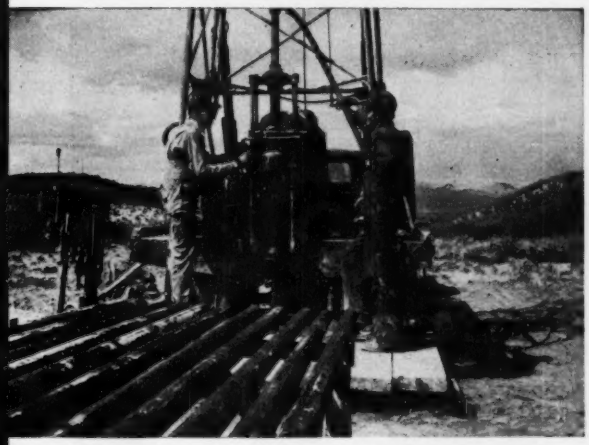

Grease-in-Dirt-out seal
Large grease reservoir prolongs lubrication intervals
Precision roller bearings maintain alignment
Full length central tube and roll shell are continuously welded to dished steel heads for uniform, perfectly balanced strength

Less lubrication and adjustment


No springs, no loose parts, no sliding metal-to-metal contact
Foreign matter can't penetrate labyrinth — lubricant preserved

Grease-in-Dirt-out Seal

# PROSPECTING



with a

# JOY 22-HD CORE DRILL

means a 3 WAY advantage!

1. HIGH MOBILITY
2. HIGH DRILLING SPEED
3. HIGHLY ACCURATE RESULTS

**You'll get true cores FAST, and *at lowest cost* with the Joy 22-HD. It's a really fast, heavy-duty diamond core drill that's designed for very accurate work in all types of formations to depths of 2,000 ft.**

**The 22-HD is furnished with gasoline, electric or compressed-air drive, all interchangeable, to suit the power source at hand. It can be furnished mounted either on skids or a truck—and the swivelhead can be screw-fed or hydraulic, as desired. The truck-mounted unit can be set up and ready to drill within thirty minutes. ● *Write for Bulletin D-28, containing full data.***

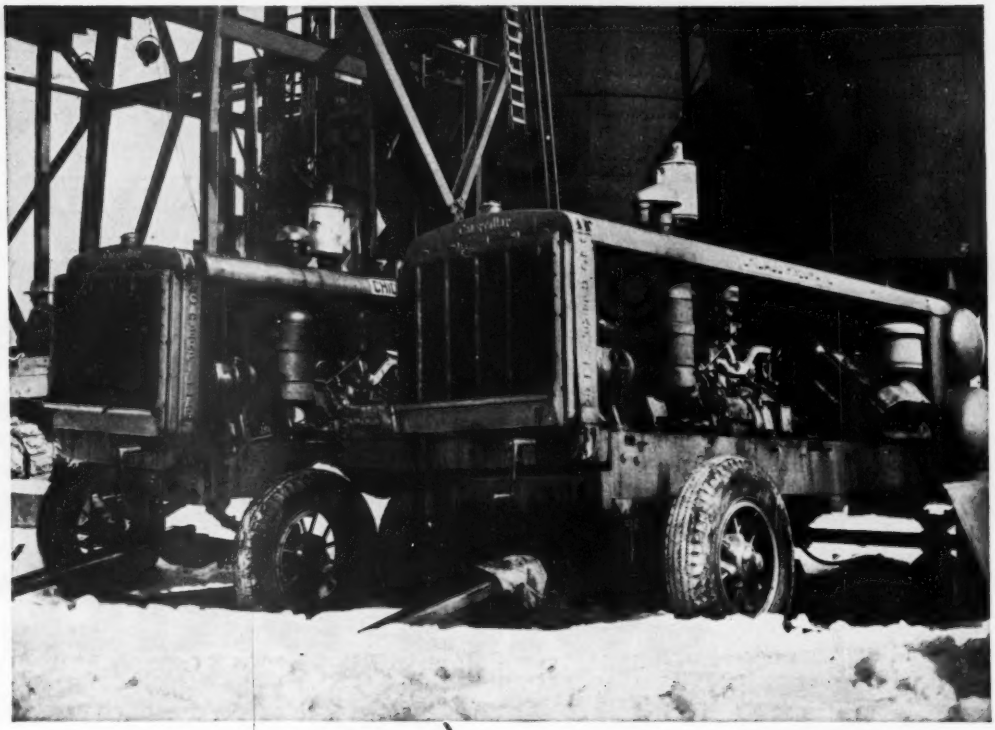
*Consult a Joy Engineer*

W & D M-4035

## JOY MANUFACTURING COMPANY

**GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.**

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO



1200 c.f.m.

Here's an efficient, dependable set-up for a job requiring 1200 cubic feet of air a minute — two CP Model 600 Diesel-driven PORTABLE AIR COMPRESSORS.

Whenever less air is needed, however, the CP Gradual Speed Regulator takes care of smaller demands by reducing engine speed proportionately, minimizing wear and maintaining peak economy.

The wide range of CP time-tested gasoline and Diesel-driven Portable Compressors — from 60 c.f.m. to 600 c.f.m. — permits the selection of the most suitable equipment for any particular kind of job.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

CP Fiftieth ANNIVERSARY

# cut tonnage costs

## with P&H ELECTRIC SHOVELS

In more and more locations these ultra-modern P&H machines are taking over the jobs that call for big production — steady digging. Users who know their cost accounting come back for more — for one proved reason . . . *lower tonnage costs.*

Contributing factors are these:

P&H Magnetorque* Hoist Drive powers hoisting motions electro-magnetically, gives you snappier dipper action — eliminates hoist generator, hoist motor, slip friction clutch and other troublesome mechanical devices.

P&H stepless power regulation is smooth and accurate — with no control fingers or contactors to give you trouble.

Independent propel, all-welded construction, filtered air cab and other modern refinements have led the way to more dependable production on a year-in, year-out basis.

If you seek lower tonnage costs in open pit work, let us tell you where you can see a P&H Electric Shovel in action. Ask about a P&H today.

*T.M. of Harnischfeger Corporation for electro-magnetic type clutch

*Every third P&H Electric Shovel sold is a repeat order*

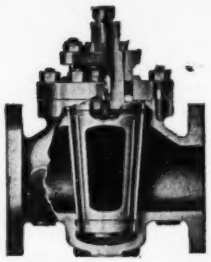
**HARNISCHFEGER**
**CORPORATION**

4454 West National Avenue • Milwaukee 14, Wisconsin

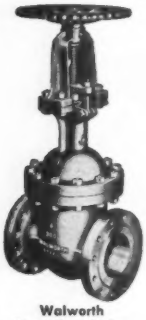
POWER SHOVELS • CRAWLER AND TRUCK CRANES • OVERHEAD CRANES • ARC WELDERS AND ELECTRODES • SOIL STABILIZERS • DIESEL ENGINES • PRE-FABRICATED HOMES

# ● VALVES

# ● PIPE FITTINGS



Walworth
Lubricated Plug Valve



Walworth
Steel Gate Valve

Walworth
Iron Body Gate Valve

Walworth
"500 Brinell" Bronze Globe Valve

Walworth
Iron Body Saddle Gate Valve

Walworth
Cast Steel Flanged Fittings

Walworth manufactures a *complete line* of valves and pipe fittings: all made to the highest standards of quality, both as to dimensional accuracy and metallurgical properties. In design, construction, and performance, Walworth products reflect more than a century of experience in the manufacture of quality valves and fittings.

Your Walworth distributor will give you full information on the *complete line* of Walworth steel, iron, and bronze, and special alloy valves and pipe fittings; also Walworth Lubricated Plug Valves, and Walseal* valves, fittings and flanges. Ask for this information today.

*Patented—Reg. U. S. Pat. Off.

**WALWORTH**

**valves and fittings**

**60 EAST 42nd STREET, NEW YORK 17, N. Y.**

**DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD**

# Rod Deck

## Gives You These 3 Big Advantages

**Ripl-Flo ROD DECK SCREENS**

LESS BLINDING! Sticky materials go through slotted openings between rods with less trouble than through conventional wire cloth or perforated plate. Rods provide a positive cutting action.

GREATER CAPACITY! Undersize passes long openings between rods more readily than through conventional screen surface. There's more open area — and cross wire blockage is eliminated. More tonnage and larger feed can be handled with a rod deck screen.

LONGER LIFE! Rod deck design permits using heavy ¾ to ½ in. rods. The rod deck costs less to operate than a conventional screen — you need only replace worn rods, not an entire screen surface.

**MONEY-SAVING APPLICATIONS**

- For scalping ahead of crushers.
- Preparing grinding mill feed.
- To replace conventional double deck screen. Rod deck requires less head room, reduces operating cost, handles larger size feed.
- Any screening operation where square separation is not necessary.

*Ripl-Flo* is an Allis-Chalmers trademark.

# ALLIS-CHALMERS

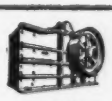
Find out how rod deck screens can cut costs and reduce downtime in your operations. Call the A-C representative in your area, or write to Allis-Chalmers, Milwaukee 1, Wisconsin.

A-3752

**Sales Offices in Principal Cities in the U. S. A. Distributors Throughout the World.**

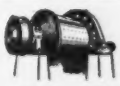
Hammermill

Vibrating Screens



Jaw Crushers

Gyratory Crushers



Grinding Mills

Kilns, Coolers, Dryers

# Cut drilling costs with THROWAWAY Bits...

## Save Steel
## Save Powder

1 Easily deformable skirt permits quick removal of bit from shank. No lost time with stuck bits.

2 Ample chip clearance allows faster drilling.

3 Short reaming sides eliminate sticking and allow close gauge following.

4 Blunt non-breaking cutting edges have self-sharpening tendency . . . are uniformly tempered hard, biting steel.

5 Large hemispherical non-plugging water outlet.

6 Lathe-cut, ground or forged parallel shank fits firmly into close tolerance bit socket. No threads required. Perpendicular socket wall allows shank to bottom in bit for maximum performance.

7 Perfect uniformly treated bit teeth assure best possible cutting power and smooth operation.

LOWER your drilling costs with smaller holes and faster drilling. Bottom with 1¼ inch holes and save costly steel and powder. Let us prove to you that the man at the drill can do more work for less cost with a Throwaway Bit. Write for new low price list and technical description of Throwaway Bit to: Portland, Oregon home office or distributors listed below. Competent field engineers and dealers are always at your service.

## THROWAWAY BIT CORPORATION

4200 N. W. YEON AVENUE., PORTLAND, OREGON

**BONNE TERRE FARMING & CATTLE CO**
Bonne Terre, Missouri

**CREATING ENGINEERING**
825 1st National Bank Building
Denver, Colorado

**GREENAWALT-WHEELOCK & CO.**
415 Mills Building
El Paso, Texas

# A "NATURAL" *for* ALUMINUM CABLE

If your plans call for the installation of aluminum cables on the basis of copper size, we would like to suggest that you consider the following point. Aluminum will heat to a greater extent than copper when the same amount of current is put through the cable.

So instead of using conventional insulations, which are seldom rated more than 140 F. (60 C.), specify Simplex-Anhydrex XX insulation. This will help overcome the heat problem because Anhydrex XX is rated at 176 F. (80 C.).

Simplex - Anhydrex XX insulation will operate at temperatures up to 176 F. (80 C.) in either wet or dry locations at voltages up to 17,000.

If you must use aluminum because of the copper shortage, let our engineers help you with your problem.

We would be more than happy to give you the latest specification data on Simplex-Anhydrex XX insulation. Simply send your request to the address shown below.

Simplex-Anhydrex XX is a product of Simplex Research.

**SIMPLEX-ANHYDREX XX**

SIMPLEX WIRE & CABLE CO.
79 Sidney St., Cambridge 39, Mass.

*No matter how you look at a Chemico plant*

**it's a profitable investment**

If you are thinking of expanding present facilities or erecting a new plant for the manufacture of heavy chemicals, look into Chemico's all-inclusive service.

PLANNING—All factors that may influence design . . . availability of raw materials and utilities, location of plant site, soil conditions . . . are checked before starting engineering designs. Each Chemico project is planned to meet your specific needs.

PROCESS—Chemico offers a wide range of processes for the production of heavy chemicals. Every one is proved in service . . . designed for maximum output at lowest product cost.

MANPOWER—Automatic operation, centralized control and efficient plant layout minimize manpower requirements. Maintenance is simple. Equipment is never "hard to get at" for repairs.

DELIVERY—Chemico trains the operating crew . . . turns over an efficiently operating plant on a one-contract, one-responsibility, performance-guaranteed basis.

*From every viewpoint,* a Chemico-built plant is a profitable investment. Proof? 37 years of successful experience in completing more than 800 installations throughout the world.

**CHEMICAL CONSTRUCTION CORPORATION**

A UNIT OF AMERICAN CYANAMID COMPANY

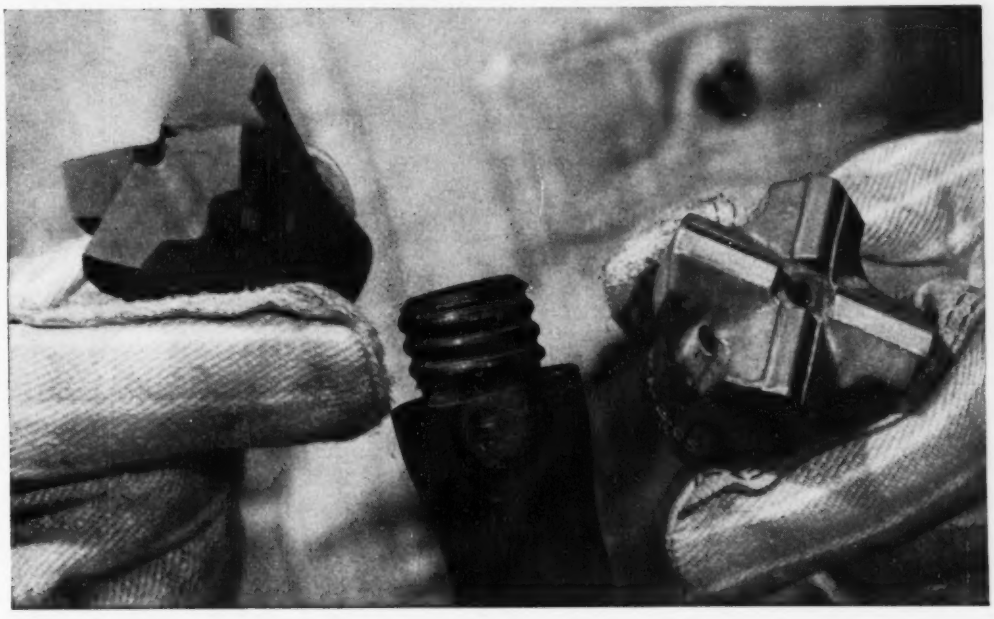
488 MADISON AVENUE, NEW YORK 22, N. Y.

CABLES: CHEMICONST, NEW YORK

TECHNICAL REPRESENTATIVES: IN EUROPE—CYANAMID PRODUCTS LTD., LONDON; IN CANADA—CHEMICAL CONSTRUCTION (INTER-AMERICAN) LTD., TORONTO; IN SOUTHERN AFRICA—SOUTH AFRICA CYANAMID (PTY) LTD., JOHANNESBURG

*Chemico plants are profitable investments*

# SWITCH TO THE BEST BIT TYPE FOR THE JOB, RIGHT ON THE JOB!



## *Both Timken® rock bit types fit the same drill steel!*

AS the ground changes on the job, you can change to the most economical bit right *on* the job — if you're using Timken® bits. They're interchangeable. Timken carbide insert and multi-use bits both fit the same threaded drill steel.

When drilling in ordinary ground use Timken multi-use bits. With correct and controlled reconditioning, they give you the lowest cost per foot of hole when full increments of steel can be drilled.

When you hit hard, abrasive ground, quickly switch to Timken carbide insert bits for greatest economy. They're your best bet for maximum speed, constant-gauge holes, small diameter blast holes and very deep holes.

By teaming up Timken carbide insert and multi-use bits, you put the best answer to every drilling requirement right at your drillers' finger tips. Both bit types are interchangeable in each thread series. And remember that both have these three important advantages: 1) made from electric furnace Timken fine alloy steel, 2) threads are not subject to drilling impact because of the special shoulder union developed by the Timken Company, 3) quickly and easily removable.

Call upon the 20 years' experience of our Rock Bit Engineering Service for help in selecting the best bits for *your* job. Write The Timken Roller Bearing Company, Rock Bit Div., Canton 6, O. Cable address: "TIMROSCO".

Timken threaded multi-use rock bit

Timken threaded carbide insert rock bit

TIMKEN

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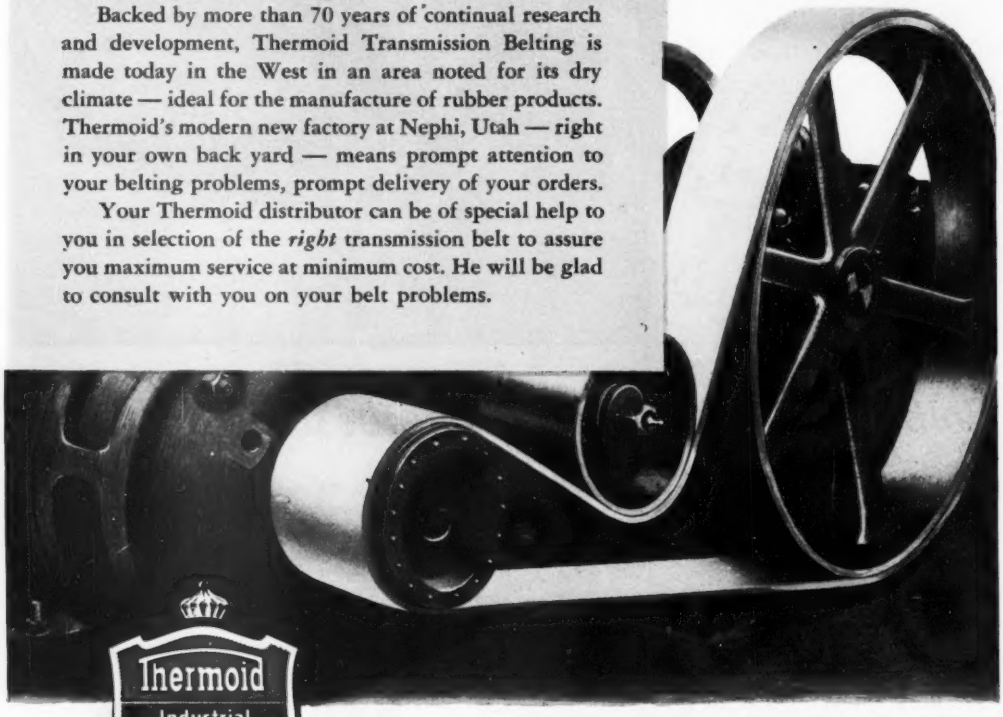
***your best bet for the best bit***
***. . . for every job***

# For the answer to Transmission Belt Problems . . . Look to THERMOID

When the going gets tough, that's when Thermoid Transmission Belts really pay off.

Backed by more than 70 years of continual research and development, Thermoid Transmission Belting is made today in the West in an area noted for its dry climate — ideal for the manufacture of rubber products. Thermoid's modern new factory at Nephi, Utah — right in your own back yard — means prompt attention to your belting problems, prompt delivery of your orders.

Your Thermoid distributor can be of special help to you in selection of the *right* transmission belt to assure you maximum service at minimum cost. He will be glad to consult with you on your belt problems.



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Conveyor & Elevator Belting • Transmission Belting
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# in WIRE ROPE, too

## *It's all in the RIGHT KIND of Muscle*

The powerful, rugged muscles of a charging rhino enable him to propel his tremendous bulk and weight at truly remarkable speed. Nature designed them well for the purpose they have to serve.

In wire rope, too, the right kind of muscle is vitally important... because different types of jobs present different types of destructive forces. Bending fatigue! Shock stress! Abrasion! Load strain! Each demands wire rope that best combines the required resistance characteristics.

Wickwire Rope gives you the benefit of long experience and specialized know-how which assures you of exactly the right kind of rope your particular job demands.

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*LOOK FOR THE YELLOW TRIANGLE ON THE REEL*

EAST: WICKWIRE SPENCER STEEL DIV.—Boston • Buffalo • Chattanooga • Chicago • Detroit • Emlenton (Pa.) • Philadelphia • New York
WEST: THE COLORADO FUEL & IRON CORP.—Abilene (Tex.) • Denver • Houston • Odessa (Tex.) • Phoenix • Salt Lake City • Tulsa
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**WICKWIRE ROPE**

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PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL & IRON CORPORATION

# WILFLEY
centrifugal PUMPS

# 30 acres 2 miles

• ***Wilfley Special High Head Sand Pumps*** play an important role in the successful reclamation program of the Hawaiian Commercial & Sugar Co.

• Each year, at the Puunene Mill, 30 to 40 acres of useless, sandy waste land are transformed into productive ground for sugar cane cultivation.

• Soil, removed from mechanically harvested cane by washers, is settled to a sludge of 15% to 25% solids. This sludge, together with a sludge of repulped filter cake, is pumped to the diked waste area. When dry, there remains a 2 to 3-ft. layer of reclaimed cultivable topsoil over the coral sands.

• WILFLEY Pumps, operating on a 24 hour-a-day, trouble-free schedule perform the tremendous task of delivering 300- 500 G.P.M. of cane washer wastes through 2 miles of 6" pipeline to the reclamation area. As a result, wastes which formerly presented a costly disposal problem, are now converted into revenue-producing land.

Wilfley Special High Head Pumps in operation at the Puunene Mill of the Hawaiian Commercial & Sugar Co

*Buy Rugged, heavy-duty Wilfley Pumps* whenever the job calls for the efficient and economical handling of sludges, slimes, slurries or sands. The new WILFLEY Model "K" Centrifugal Sand Pump, embodying many important mechanical improvements, delivers higher efficiencies, stepped-up production, worthwhile power savings and lower operating costs. Easy interchangeability of wear parts. Low maintenance costs. Every application individually engineered. Write or wire for complete details.

**A. R. Wilfley & Sons, Inc.**
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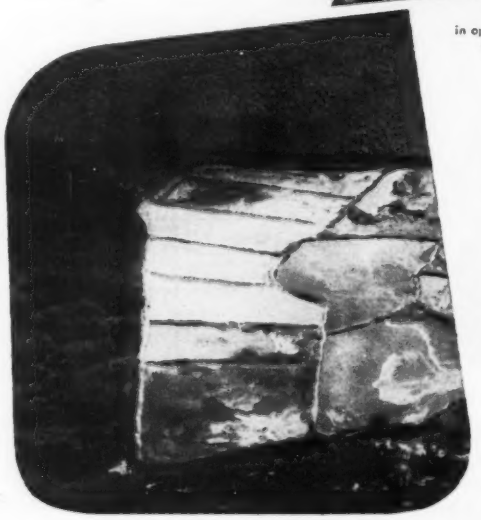


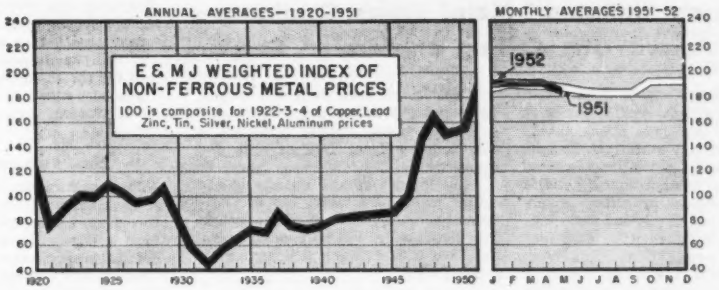
Buy WILFLEY for cost saving performance

Companion to the famous WILFLEY Acid Pump

Upper: Reclaimed land under cultivation
Center: Diked reclamation area
Bottom: Waste land to be reclaimed

# E&MJ OUTLOOK

**PRICES**


ANNUAL AVERAGES—1920-1951
E & M J WEIGHTED INDEX OF NON-FERROUS METAL PRICES
100 is composite for 1922-3-4 of Copper, Lead Zinc, Tin, Silver, Nickel, Aluminum prices
MONTHLY AVERAGES 1951-52
1952
1951
J F M A M J J A S O N D

**MARKETS**

**Buyers walked out** when the lead market dropped late in April. Heroic efforts to establish a selling basis on solid ground forced the price down to 15¢ by mid-May. The slide in lead and silver brought our index of nonferrous metal prices down to 186.88 for May from 194.93 in April.

**The zinc price was hovering on the edge** of a decline as May ended, and antimony, cadmium, and quicksilver were over the edge. Copper is still tight, as will be nickel, cobalt, selenium, and columbium, for some time to come.

**These price declines** are part of sobering up after last year's big party of unlimited consumer demand. They won't affect production too greatly, and a steadier demand should prevail.

•

**LABOR**

**The CIO Steelworkers' drive** to displace Mine, Mill in the nonferrous mining industry seems to have high-centered. At least no one mentioned it at the Philadelphia convention.

**Mine, Mill is going right after that** 25¢-an-hour increase. In the face of easing metal markets, this means trouble.

•

**AT HOME**

**The clang of closing doors** on "vacationing" appliance plants proves that consumers are going to make last year's car, refrigerator, washer, or television set do for a while yet. Economists generally unite in predicting that the real test for business will come next year.

**A six-fold increase** in U.S. beryl output might result from flotation tests the USBM is running in a feldspar plant down south.

**Magma has what might well be a** new mine east of present workings, judging by the conservative account in her annual report.

•

**ABROAD**

**Chile was disappointed** when the expected rush to buy her copper at 35½¢ per lb. didn't materialize the first week that U.S. consumers were permitted to buy. The fog surrounding pricing detail was too thick. Foreign prices were all over the lot as May ended.

**Actually, few of the world's producers want** a sharp price increase now. It only heightens the inevitable drop that must come before long.

**Had you thought of** the Caribbean as a mineral-producing area? Alcoa in Haiti; Reynolds, Kaiser, and Aluminium, Ltd. in Jamaica; two boys from Duluth mining iron ore in Puerto Rico; Matahambre, Nicaro, plus some new copper and iron prospects in Cuba; it's a region with a future.

**With $19-million of needed financing arranged,** and with the new cobalt-copper-nickel process working well in pilot plant tests, Sherritt Gordon seems all set.

# MARKETS—Trends and Prices

## Pressure on "Inflated" Metal Prices Continues—Chilean Accord Lifts Ceiling on Foreign Copper

CONSUMER RESISTANCE to high prices has made manufacturers of goods in ample supply cautious about taking on over-priced raw materials. Despite continued tension in the international situation, and extraordinary activity under the defense program, buyers look for prices of highly inflated items to decline to what may be described as a realistic level.

As evidence of the trend toward a more rational market in nonferrous metals, the National Production Authority, effective May 15, revoked its controls on lead, antimony, bismuth, and cadmium. At the same time, controls on zinc were eased, removing the metal from the provisions respecting allocation, delivery and use. Also, the inventory period on zinc was extended to 60 days, and restrictions on toll agreements were suspended.

The *E&MJ* index of nonferrous metal prices declined 8.05 points in May to 186.88. This compares with 189.47 in May a year ago and 142.02 in May, 1950. The drop in lead and foreign silver caused the downward adjustment.

The Federal Reserve index of industrial production for April was 216% of the 1935-39 average. This compares with 220% in March and 223% in April a year ago.

### New Chilean Accord

An agreement affecting copper imports from Chile has been reached, Dr. John R. Steelman, acting head of the Office of Defense Mobilization, announced May 21. The new accord permits fabricators in this country to pay a higher price for imported copper. The conditions outlined in the directive were held by members of the industry to be unworkable so far as the pricing arrangement was concerned.

Dr. Steelman's statement, in part, follows:

"In order to encourage the importation of adequate supplies of foreign copper by private buyers under existing conditions, the U. S. Government is acting through Office of Price Stabilization to permit brass mills and copper wire mills to add to ceiling prices an amount of 80% of any increase in cost of foreign copper above the 27½¢ level contained in the Chilean agreement just terminated.

"The OPS will periodically announce permitted increases in ceiling prices which will be adjusted to reflect variations in foreign prices of copper and in ratio of the foreign copper used. The initial adjustment will be effective June 16, 1952.

"Comparable treatment will be provided other primary users of foreign copper, including copper produced in this country from foreign ores and concentrates.

"The impact of any change in the ceiling prices of primary copper products of subsequent levels of production and distribution will be treated in accordance with existing pricing standards of OPS."

### Domestic Copper to Hold

The statement by the head of ODM temporarily killed all prospects of an upward revision of the domestic ceiling price of copper. He said: "It is the policy of the government not to undertake now, and to avoid in the future, changes in existing price ceilings of domestically refined copper, brass mill scrap, or copper and copper alloy scrap."

Meetings of producers and officials in NPA and OPS held late in the month only added to the state of general confusion over marketing copper and fabricated copper products under the Steelman plan. A free market for copper abroad and here appeared to be the simplest solution of the problem made "unworkable" by excessive government intervention, those attending the meetings maintained.

Foreign Copper (Chilean and custom smelter metal) sold in this market on the basis of 27½¢, f.a.s. New York, virtually all month. Late in May it was reported that the Chilean authorities were holding out for 35½¢ a lb., f.a.s. port of shipment. However, pending final settlement of Chile's selling program, the trade was slow in resuming purchases in that market, particularly at a level that was regarded as too high under prevailing unsettled conditions. It is one thing to sell at premium prices when only relatively small tonnages are involved and another when large tonnages move into the picture. The Chilean Bank on May 8 took over control of all copper sales made in that country. Strikes at Anaconda's properties in Chile were settled after a work stoppage of about 16 days.

Beginning May 29, sales of Chilean copper were noted at higher prices.

### Stockpile Copper Released

President Truman authorized the release of 22,000 tons of copper from the stockpile to make up the current deficit in the supply caused by the strike in Chile and an embargo on Chilean shipments ordered for May 8, pending settlement of the pricing arrangement.

With all this uncertainty hanging over the copper market, the NPA announced that higher allotments of the metal will be authorized for civilian goods for the third quarter. June allocations of refined copper were fixed at 104,899 tons, against 104,598 tons in May.

### New York Lead 15¢

Consumers rarely buy much in a falling market. Lack of buying interest forced the price of lead down to 15¢ a lb., or 4¢ below the recent peak. Liberal offerings from abroad at concessions continued over most of the month, which naturally made buyers shy away from the market. Producers were willing to test the market at the lower selling basis to determine whether the price could be stabilized. Some market authorities hold that a price varying between 14¢ and 16¢ would be fair to all concerned under prevailing circumstances.

### Average Prices for May (E&MJ Quotations)

| | |
|---|---|
| **Copper:** | |
| Electrolytic, domestic, refinery | 24.200 |
| Electrolytic, export, refinery .. | 27.908 |
| **Lead:** | |
| Common, New York ..... | 15.731 |
| Common, St. Louis ..... | 15.531 |
| **Silver and Sterling Exchange:** | |
| Silver, New York, per oz. .... | 85.405 |
| Silver, London, pence per oz . | 74.761 |
| Sterling Exchange, "Checks" | 280.063 |
| **Zinc:** | |
| Prime Western, East St. Louis | 19.500 |
| **Tin:** | |
| New York Straits ..... | 121.500 |
| New York, 99% min. ....(e) | 120.500 |
| **Gold**, per oz. U.S. price .... | $35.000 |
| **Quicksilver**, per flask ..... | $199.615 |
| **Antimony** (E&MJ) (d) .... | 45.542 |
| **Antimony**, bulk, Laredo .... | 42.077 |
| **Antimony**, in cases, Laredo . | 42.577 |
| **Platinum**, refined, per oz. .. | $90.000 |
| **Cadmium**, (a) ..... | 238.846 |
| **Cadmium** (b) ..... | 248.654 |
| **Cadmium** (c) ..... | 258.462 |
| **Aluminum**, 99% plus, ingot | 19.000 |
| **Magnesium**, ingot ..... | 24.500 |
| **Nickel** (f) ..... | 56.500 |

Domestic quotations, unless otherwise stated, are in cents per pound. Sterling exchange checks, in cents. Quicksilver, per flask of 76 lbs.

(a) Cadmium average based on the producers' quotation.

(b) Cadmium average based on the average of the producers' and platers' quotation.

(c) Cadmium average based on platers' quotation.

(d) Domestic, 5 tons or more but less than carload lot, packed in cases, f.o.b. New York.

(e) Tin content.

(f) F.o.b. Port Colborne, U.S. duty included.

The weakness in lead, reduced activity in the automobile industry, and uncertainty over the outcome of the wage dispute in steel has been reflected in shrinking sales of zinc. The undertone of the market was easy, particularly in the die casting grade, where supplies have been accumulating. So far, Prime Western has enjoyed a steady market.

Antimony succumbed to falling prices abroad and a weak ore market. The leading smelter dropped its price 5¢ a lb. to 39¢, f.o.b. Laredo, in bulk effective May 20. Cadmium declined 30¢ to $2.25 a lb., May 15.

## "Free" Gold Market

Trading in the free markets was fairly active last month and prices realized were higher. The largest turnover was in Paris. Indian purchases from Kuweit have been resumed. Quotations in the free market, according to Pick's World Currency Report, were as follows:

| | COINS | | BARS (12.5 kg.) | |
|---|---|---|---|---|
| | April 30 | May 31 | April 30 | May 31 |
| NEW YORK, transit | ..... | ..... | $37.38 | $37.75 |
| MANILA | $48.50 | $48.50 | 39.75 | 39.60 |
| HONG KONG | 47.50 | 48.00 | 40.00 | 40.35 |
| BOMBAY | 51.00 | 51.25 | 46.75 | 47.50 |
| TANGIER | 49.85 | 50.75 | 37.65 | 37.75 |
| BEYROUTH | 48.95 | 51.50 | 37.60 | 37.85 |
| PARIS | 53.50 | 53.50 | 39.25 | 39.40 |
| BUENOS AIRES | 49.50 | 48.50 | 41.13 | 40.75 |

*(Markets continued on page 102)*

## Major Metals

### U. S. DAILY AND AVERAGE PRICES

| May 1952 | Electrolytic Copper (a) Domestic | (b) Export | Straits Tin New York | Lead New York | Lead St. Louis | Zinc East St. Louis |
|---|---|---|---|---|---|---|
| 1 | 24.200 | 27.425 | 121.500 | 18.000 | 17.800 | 19.500 |
| 2 | 24.200 | 27.425 | 121.500 | 17.000 | 16.800 | 19.500 |
| 3 | No Market | 27.425 | 121.500 | 17.000 | 16.800 | 19.500 |
| 5 | 24.200 | 27.425 | 121.500 | 17.000 | 16.800 | 19.500 |
| 6 | 24.200 | 27.425 | 121.500 | 17.000 | 16.800 | 19.500 |
| 7 | 24.200 | 27.425 | 121.500 | 17.000 | 16.800 | 19.500 |
| 8 | 24.200 | 27.425 | 121.500 | 17.000 | 16.800 | 19.500 |
| 9 | 24.200 | 27.425 | 121.500 | 17.000 | 16.800 | 19.500 |
| 10 | No Market | 27.425 | 121.500 | 17.000 | 16.800 | 19.500 |
| 12 | 24.200 | 27.425 | 121.500 | 15.000 | 14.800 | 19.500 |
| 13 | 24.200 | 27.425 | 121.500 | 15.000 | 14.800 | 19.500 |
| 14 | 24.200 | 27.425 | 121.500 | 15.000 | 14.800 | 19.500 |
| 15 | 24.200 | 27.425 | 121.500 | 15.000 | 14.800 | 19.500 |
| 16 | 24.200 | 27.425 | 121.500 | 15.000 | 14.800 | 19.500 |
| 17 | No Market | 27.425 | 121.500 | 15.000 | 14.800 | 19.500 |
| 19 | 24.200 | 27.425 | 121.500 | 15.000 | 14.800 | 19.500 |
| 20 | 24.200 | 27.425 | 121.500 | 15.000 | 14.800 | 19.500 |
| 21 | 24.200 | 27.425 | 121.500 | 15.000 | 14.800 | 19.500 |
| 22 | 24.200 | 27.425 | 121.500 | 15.000 | 14.800 | 19.500 |
| 23 | 24.200 | 27.425 | 121.500 | 15.000 | 14.800 | 19.500 |
| 24 | No Market | 27.425 | 121.500 | 15.000 | 14.800 | 19.500 |
| 26 | 24.200 | 27.425 | 121.500 | 15.000 | 14.800 | 19.500 |
| 27 | 24.200 | 27.425 | 121.500 | 15.000 | 14.800 | 19.500 |
| 28 | 24.200 | 27.425 | 121.500 | 15.000 | 14.800 | 19.500 |
| 29 | 24.200 | 31.475 | 121.500 | 15.000 | 14.800 | 19.500 |
| 30 | Holiday | 31.925 | Holiday | Holiday | Holiday | Holiday |
| 31 | No Market | 31.925 | 121.500 | 15.000 | 14.800 | 19.500 |
| **AVERAGES FOR MONTH** | | | | | | |
| May | 24.200 | 27.908 | 121.500 | 15.731 | 15.531 | 19.500 |
| **AVERAGES FOR WEEK** | | | | | | |
| May | | | | | | |
| 7 | 24.200 | 27.425 | 121.500 | 17.167 | 16.967 | 19.500 |
| 14 | 24.200 | 27.425 | 121.500 | 16.000 | 15.800 | 19.500 |
| 21 | 24.200 | 27.425 | 121.500 | 15.000 | 14.800 | 19.500 |
| 28 | 24.200 | 27.425 | 121.500 | 15.000 | 14.800 | 19.500 |
| **CALENDAR WEEK AVERAGES** | | | | | | |
| May | | | | | | |
| 3 | 24.200 | 27.425 | 121.500 | 17.833 | 17.633 | 19.500 |
| 10 | 24.200 | 27.425 | 121.500 | 17.000 | 16.800 | 19.500 |
| 17 | 24.200 | 27.425 | 121.500 | 15.000 | 14.800 | 19.500 |
| 24 | 24.200 | 27.425 | 121.500 | 15.000 | 14.800 | 19.500 |
| 31 | 24.200 | 29.600 | 121.500 | 15.000 | 14.800 | 19.500 |

## Silver, Gold and Sterling

### DAILY AND AVERAGE PRICES

| May 1952 | Sterling Exchange "Checks" | Silver (c) New York | Silver London | Gold London | Gold (d) United States |
|---|---|---|---|---|---|
| 1 | 280.7500 | 88.000 | 77.000d. | 248s. | $35.00 |
| 2 | 280.6250 | 88.000 | 77.000d. | 248s. | 35.00 |
| 3 | (e) | (e) | (e) | (e) | 35.00 |
| 5 | 280.6875 | 88.000 | 77.000d. | 248s. | 35.00 |
| 6 | 280.6875 | 87.000 | 77.000d. | 248s. | 35.00 |
| 7 | 280.6250 | 87.000 | 76.000d. | 248s. | 35.00 |
| 8 | 280.3750 | 87.000 | 76.000d. | 248s. | 35.00 |
| 9 | 280.3750 | 87.000 | 76.000d. | 248s. | 35.00 |
| 10 | (e) | (e) | (e) | (e) | 35.00 |
| 12 | 280.5000 | 87.000 | 75.750d. | 248s. | 35.00 |
| 13 | 280.9375 | 86.000 | 76.000d. | 248s. | 35.00 |
| 14 | 280.3750 | 86.000 | 75.000d. | 248s. | 35.00 |
| 15 | 280.5000 | 85.000 | 75.000d. | 248s. | 35.00 |
| 16 | 280.4375 | 84.000 | 74.000d. | 248s. | 35.00 |
| 17 | (e) | (e) | (e) | (e) | 35.00 |
| 19 | 280.3750 | 84.000 | 73.500d. | 248s. | 35.00 |
| 20 | 280.2500 | 84.000 | 73.500d. | 248s. | 35.00 |
| 21 | 280.0625 | 84.000 | 73.500d. | 248s. | 35.00 |
| 22 | 279.3750 | 84.000 | 73.500d. | 248s. | 35.00 |
| 23 | 279.2500 | 84.000 | 73.500d. | 248s. | 35.00 |
| 24 | (e) | (e) | (e) | (e) | 35.00 |
| 26 | 279.0000 | 84.000 | 73.500d. | 248s. | 35.00 |
| 27 | 278.6250 | 84.000 | 73.500d. | 248s. | 35.00 |
| 28 | 278.7500 | 82.750 | 73.500d. | 248s. | 35.00 |
| 29 | 278.7500 | 82.750 | 72.500d. | 248s. | 35.00 |
| 30 | Holiday | Holiday | 72.500d. | 248s. | Holiday |
| 31 | (e) | (e) | (e) | (e) | 35.00 |
| **AVERAGES FOR MONTH** | | | | | |
| May | 280.063 | 85.405 | 74.761 | — | 35.00 |
| **AVERAGES FOR WEEK** | | | | | |
| May | | | | | |
| 7 | 280.675 | 87.600 | — | — | — |
| 14 | 280.513 | 86.600 | — | — | — |
| 21 | 280.325 | 84.200 | — | — | — |
| 28 | 279.000 | 83.750 | — | — | — |

Calendar week averages, New York silver: May 3rd, 88.000; 10th, 87.200; 17th, 85.600; 24th, 84.000; 31st, 83.375.
(e) No market (Saturday).

THE above quotations for major non-ferrous metals are our appraisal of the important United States markets, based on sales reported by producers and agencies. They are reduced to the basis of cash, New York or St. Louis. All prices, except gold and silver, are in cents per pound.

(a) Net prices at refineries on Atlantic seaboard. To arrive at the delivered New England basis add 0.300c. per pound, the average differential for delivery charges.

(b) Our export quotation for copper reflects prices obtaining in the open market and is based on sales in the foreign market reduced to the f.o.b. refinery equivalent, Atlantic seaboard. On f.a.s. transactions we deduct 0.075c. for lighterage, etc., to arrive at the f.o.b. refinery quotation.

Copper, lead and zinc quotations are based on sales for both prompt and future deliveries; tin quotations are for prompt delivery only.

Quotations for copper are for the ordinary forms of wirebars and ingotbars; cathodes are sold at a discount of 0.125c. to 0.15c. per pound. Quotations for zinc are based on Prime Western brands. Zinc in New York commands a premium over the St. Louis basis equal to the freight differential. Contract prices for High Grade zinc delivered in the East and Middle West, effective Jan. 1, 1951, commanded a premium of 1.35c. per pound over the current market for Prime Western; Special High Grade 1.50c.

Quotations for lead are based on domestic common lead. Corroding lead commands a premium of 10 points.

(c) The daily New York silver quotation reported by Handy & Harman is for silver contained in ores and other unrefined silver-bearing materials, in cents and fractions of a cent per troy ounce. It is determined by Handy & Harman on the basis of actual sales of bar silver .999 fine in amounts of 50,000 ounces or more for nearby delivery at New York, as reported daily by regular suppliers, and is usually one-quarter cent below the price paid for such bar silver, this deduction being the allowance to such suppliers for carrying, delivering and marketing. In addition to foreign silver, the quotations also apply to domestic silver if such silver enters into the New York market.

The Treasury's purchase price of newly mined domestic silver is 90.5c. per troy ounce 1000 fine, effective July 1, 1946. London silver in pence per troy ounce, basis .999 fine.

(d) U. S. Treasury's gold price. Actual payment by the United States Treasury for gold is at 99.75 per cent of the price quoted by the Treasury, which is equal to $34.9125.

# Behind the By-Lines . . .

G. P. Lutjen

**Our feature picture this month** was shot on location on the Navajo Indian Reservation and we hope that you'll enjoy the glimpse into the life and times of today's uranium hunters (p. 72).

If there are any Indian lore experts in the audience, we'd appreciate their help on one point. At the left of page 74 and the right of page 75, you'll see the hero and heroine, respectively, of our story, standing before a round adobe edifice. This is standard housing for the Navajo Indian and is known as a "hogan" (no accent on either syllable, if that's possible). Now in every hogan we have ever seen, except for two or three set up along Route 66 to trap tourists, the doorway always faces East. There's a pair of bicycle clips in it for anyone who can tell us why.

**One of our editors has just won** the purple paste pot for "heroism above and beyond the call of duty." To cover some hot mining developments in the Caribbean, Al Knoerr took a plane to Puerto Rico last week. Just as we went to press, we received this communique in a trembling hand.

*"We had some flight out of New York. Hit a tropical storm, and in flying over it at about 22,000 ft., we suddenly dropped about 2,000 ft. and were right in the midst of lightning, rain and clouds. The big ship got tossed so badly, the luggage came up through the floor of the plane from the compartment below my seat. My seat belt wouldn't hold me down, so I spent most of the time hanging on to the arms.*

*"But after a while it all simmered down and the flight captain came back to look us all over. One look at the pillows, books, and small luggage all over the floor was enough. He ordered the stewardess to serve stiff scotch and sodas all around. So I had my first scotch breakfast.*

*"For once in my life (when the ship was tossing its worst) I thought I might like to change places with Hans Wanders on a Wednesday afternoon at 3.55 pm when all the 'major sellers' are changing the prices of copper, lead, and zinc at once."*

Once a week Hans Wanders publishes *E&MJ Metal & Mineral Markets*, THE word on metal prices. Normally the paper is put to bed at 4:30 pm. Last minute changes in prices, however, can cause more trouble than a pillow fight in a molasses factory and compare favorably with seven-year locusts and the Bubonic plague. Knoerr really must have spent some desperate moments in the air.

**Scouting Report:** Experts from the Caterpillar Tractor Co. have just given a couple of "Made in USSR" tractors a thorough going over. Their report puts serious dents in a popular American theory that when it comes to machinery know-how, the Russians are a bunch of feather merchants.

True enough the tractor, the Stalinetz 80, is a copy of an American machine that probably was lend-lease to Russia, but here is what they found:

The Reds redesigned the machine to fit more convenient metric dimensions—no mean engineering feat. Appearance was unimportant. Parts are rough on the outside but careful attention was given where part finish and close tolerance counted. Antifriction bearings are very good. Although raw materials available differ slightly, metallurgy on the Red copy is excellent. The tractors were probably produced on an assembly line. All and all the experts found the captured machines "a great surprise" and "of much better quality than . . . expected."

**For the ladies,** we pass this along verbatim.

"Throw away your needles and thread! Enjoy more leisure time by using this new adhesive fabric mender called Fix-so. Darns socks, patches jeans, mends sheets, turns up hems, puts in zippers. Anything you can do with needle and thread, can be done faster and better with this new magic mending fluid. Apply like glue and press firmly together—that's all there is to it. Can be used on any color fabric and is guaranteed to wash, iron, or boil. One tube will darn over 150 socks and mend hundreds of rips and tears."

If you want a tube of this fabulous stuff, send a buck ($1) to Cossman Co., 6612 Sunset Blvd., Hollywood (Where else?) 28, Calif.

**What happened on last month's cover** shouldn't happen to *Pravda*. Under a picture of the Yellow Pine plant we casually stated, "The only antimony smelter in the U. S. increases output." Well, no sooner was the magazine out, than we would have given a half interest in the editor's mahogany desk to have it back. It seems that somewhere in this favored land of ours there is another antimony smelter, run by the National Lead Co. Of course this plant, at Laredo, handles only foreign ore, but there she is smelting away. So with your permission, we'll take back the "only."

We must say that the National Lead people have been bricks about this whole incident. With the exception of a delicately applied needle in sensitive spots here and there, they have made no fuss.

**Latest trends in advertising** have us mildly worried. Radio, TV and all kinds of periodicals are sprinkled with a cigarette manufacturer's encouragement to buy packs of other brands, remove a cigarette from each pack, and tear the cover off. Then buy his brand. Mangle one of these. Apparently you can note some significant difference, but all we've gotten so far is a pile of tobacco crumbs.

These destructive binges are not serious if confined to cigarettes, and probably provide an emotional outlet at least equal to the cutting out of paper dolls, but this thing could be carried to extremes under the leadership of power-mad advertising men. For instance, Westinghouse, only last month, announced its own "dare to compare" sales program, featuring a "blindfold strip-down test."

Sociological implications of this trend are even more dire. Why if this technique were ever applied to matrimony . . . say, there's a thought.

ENGINEERING AND MINING JOURNAL

JUNE, 1952

# Cycle With A Difference

AT FIRST GLANCE, one might think that lead, at least, had come full cycle in the last three years. As it was in June of 1949, lead has reached a point where supplies are adequate and price is easy. Other metals have reached, or soon will, this same position of full supply and falling price.

There are certain quite significant differences between the present and 1949, however. Let's take a look at them, and also consider a few of the cold economic facts this hectic three-year period has made clear.

**Metal inventories** in consumers' hands were much greater in 1949 than they are now. Hence, consumers must come back into the market sooner than they did in 1949. Metal prices aren't likely to decline as far.

**Public resistance** to buying new cars, appliances, "hard goods" of all kinds, has taken a lot of pressure off manufacturers of products using metals. In balance, metals ought to be chewed up at about present rates for the rest of the year. More nearly normal markets are in prospect in every line. Trouble is that everyone is so used to skyrocketing sales and excess profits figuring that any turn back toward normal seems like a slump. In 1949, the surge of consumer spending (and Korea) were still ahead.

**Continued inflation** is the long-term prospect, unless we change our ways. It's true that business set-backs loom ahead, because the public seems bent on deflating prices by refusing to buy. Also, Britain and France among others are taking deflationary steps, but the U.S. Government is actively promoting inflation, and we think that in the long run the willingness of all governments to borrow against the future to avoid settling today's bills today will prevail.

Now as to the facts that have been most outstanding in these last three years:

**Producers can't control prices.** No voluntary action of domestic miners can force metal prices up, legally, that is. Conversely, lower prices do force production cut-backs at many mines unable to reduce costs quickly.

**Price affects production.** Note that high prices do boost mine output, whether it's lead, tungsten, mica, uranium, or what have you. Usually, however, mine production has really begun to climb about the time that prices begin to sag, viz. lead and foreign tungsten.

**No metal will be permanently short.** If industry wants it badly enough, adequate supplies of any metal can be found at a price. Too many people sought to create excitement in recent months by dire forecasts of chronic shortages of copper, lead, zinc, etc. Too many people took some Fair Deal economists too seriously.

**Metal consumers behave strangely.** They fight, beg, cajole to get metals when supplies are short and prices are rising. They stop buying when metal is plentiful and prices soften. When the government stockpilers do this, it's called "bureaucratic bungling." Of course, when consumers do it, they operate as individuals and taxpayers don't carry the load.

**U.S. markets can't be insulated.** The rest of the world is a prime factor in U.S. metal markets. Our stockpiling and preparedness drives brought on world shortages of metals, which in turn aggravated shortages in the U.S. Our price control efforts undoubtedly prolonged the world-wide unbalance. Now, however, easing demands abroad are forcing U.S. markets down once more. "The world," it is true, "is too much with us," but it's a situation we've got to live with.

**Change is the only certainty.** Too many people have regarded whatever the immediate situation was in recent years as if it were permanent. Nothing is really permanent. Shortages turn to surpluses. High prices fall, then rise again. Competition for markets among metals gets keener. The cost-cutting methods of today are the outworn methods of tomorrow.

That's the real lesson of this cycle just completed. The mining industry is subjected to severe and constantly-shifting stresses, both from within and from without. In the future, these stresses will be stronger rather than weaker. To prosper, you as an individual, and your company, are going to have to be alert to new opportunities and energetic in seizing them. Those who are, need have no fear of the cycle ahead, whatever it may bring.

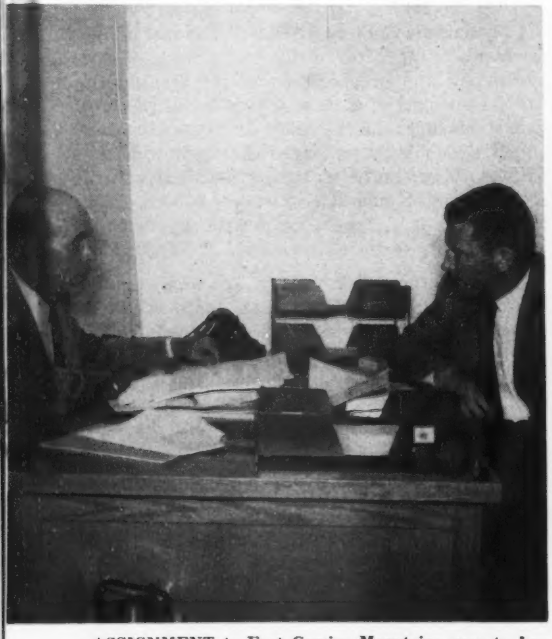
## "Mister if there's uranium here, we'll find it"

*Editor's Note:*

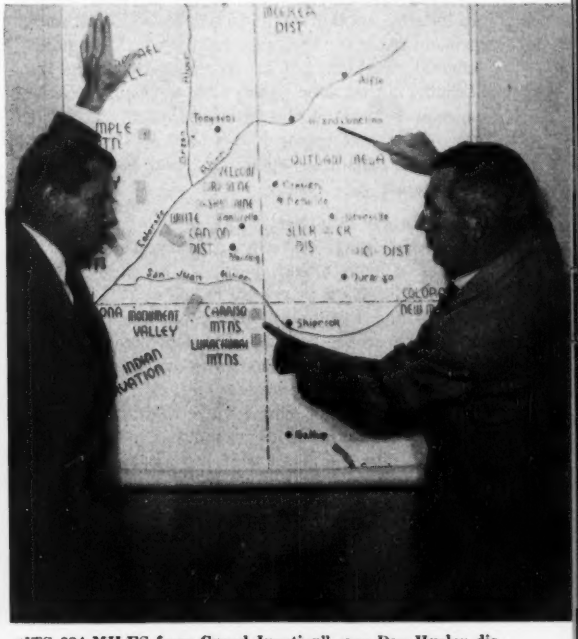
*We don't know if Leo Miller ever actually made the statement above. We use it though, because from our observation, that's how uranium prospectors feel about it. This applies not only to the men of the AEC, but to prospectors, mining companies, the USGS and everyone else sweating to find a few tons of uranium. These men are finding more uranium today than most experts believed possible, as late as 1947.*

**LEO J. MILLER. To find out who he is, what he does, see text at right.** ➡

# The Uranium Geologist



**ASSIGNMENT to East Carrizo Mountains goes to Leo when he checks in with E. V. Reinhardt, chief of the Geologic Investigations (GI) Section.**




**"ITS 324 MILES from Grand Junction" says Dan Hurley discussing the assignment with Leo who plans to drive his trailer down and take his wife, Julie.**

URANIUM IS ONE of the geologist's greatest challenges. Technically, it's as baffling as anything he has come up against. Physically the search is tough, like that for any mineral, with extremes in climate and as rugged a patch of country as man ever set foot in.

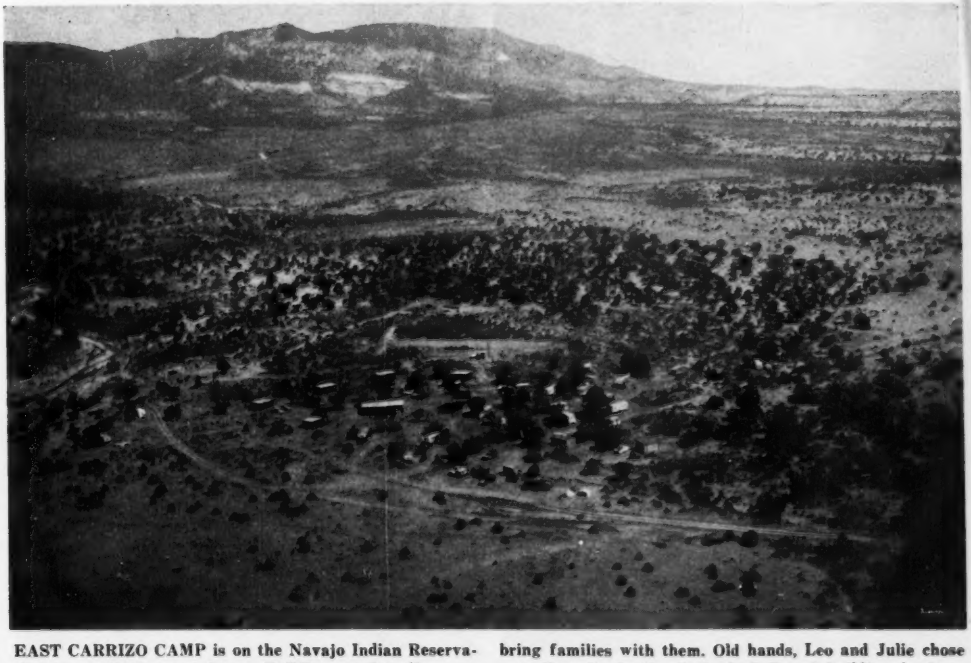
Specifically, this is the story of Leo Miller, one of the geologists who has taken up this challenge, but essentially it's a life-sized picture of all the young geologists working for the U. S. Atomic Energy Commission. And to a larger extent, it's the story of all the men, technically trained or self-taught, government, company or self-employed, who are seeking uranium in the Colorado Plateau.

Leo is 27 years old, a native of California. He served for three years in the mountain infantry during World War II and for a year was company commander with the Philippine Mountain Scouts. In June, 1950, he was graduated from the University of Southern California, one of the top three students in geology. He worked briefly for a geophysical company in Texas and then, a little more than a year ago, joined the AEC to become part of the largest concentrated exploration program in history.

Leo was assigned to the Grand Junction Exploration Branch (GJEB) whose particular bailiwick is the Colorado Plateau. After security clearance and other formalities had been taken care of, Leo found himself in the Geologic Investigation (GI) Section. He might well have gone to the Exploration Section which handles GJEB's intensive drilling programs, or to the Research Section which takes new type equipment through the development stages. But Leo's background (he had done a lot of mountain climbing) and interest made him a logical candidate to work in the G. I. section.

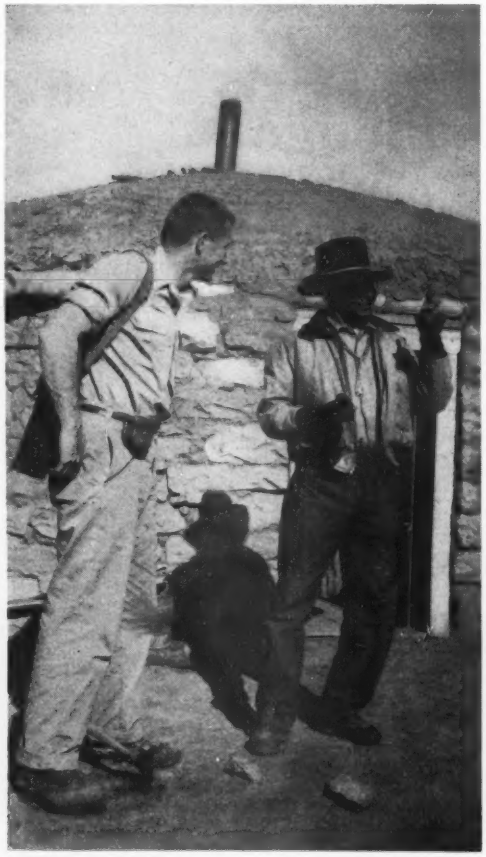
Main function of the GI section is to run down the source of samples sent in by prospectors from all over the plateau. Investigate to see if the ground is a potential uranium mining area, and if so, to recommend the drilling necessary to get a true picture of the resources. To do this job the section is divided in teams, usually of two men. At present a number of these teams are scattered over the plateau. More and more as they cover ground, they are making their own initial discoveries. Particularly is this true in the Grants Area on the fringe of the plateau. Just what kind of a life these men are getting into, you will see on these and the following pages. Let's start out with Leo (below, left).

# Takes Up the Challenge



**EAST CARRIZO CAMP is on the Navajo Indian Reservation in northeastern Arizona. Buildings and trailers are offices and housing for AEC and contractor's men who bring families with them. Old hands, Leo and Julie chose a trailer site in the "suburbs." Round building in foreground is an Indian hogan (home).**

CLAUSTROPHOBIA is no problem here, and the wide open spaces make the plane table ideal for mapping local geologic structure, as Leo is doing here. Topographic maps of large areas are usually made by plane.



TOM TAPAHANSO tells Leo where he found rich sample. Alert Navajos have made several new discoveries.

# Leo's Day

LEO MILLER gets out of bed in the morning and eats breakfast, but there the resemblance of his daily life to that of 99% of American breadwinners ends. Sure, there are days when he only walks down to the office and spends a morning over the drawing board, but six days out of seven will find him pushing a Jeep or power wagon where no man-made machine was ever meant to go.

As a member of GJEB's Exploration Section, his main job is to estimate the uranium potential of a given area, and on the basis of the geology, to recommend a drilling program if the area warrants one. To accomplish this, Leo must run down every lead he gets; from a rich sample brought in by a Navajo prospector to a radioactive anomaly picked up by the airborne scintillation counter. He must be a scientific detective of high order: first, to recognize small well-hidden clues; second, to add them up and deduce the true picture.

NAVAJO MINERS talk with Leo as he looks over their ore. Indians hold all reservation mineral rights.

MINERALIZED OUTCROPS along sandstone rims are systematically measured by Leo with Brunton compass.

RADIO CONTACT is made daily with Grand Junction. Leo and John Masters go over maps while waiting for Project Chief Ray Garcia to go on the air.

MINE HEADINGS like this help Garcia and Leo with information on otherwise unexposed uranium orebodies.

HOUSEWORK'S the same . . .

. . . BUT NOT shopping.

# Julie's Day

MOST OF THE TIME Julie Miller likes her life on the Navajo Indian reservation. There are times when she misses some of the city's more prominent attractions, but she feels that there's plenty of time for that later on.

Keeping house in a trailer is harder than it looks. Because quarters are not exactly spacious, things just have to be kept in the right place. And Julie will assure you that no way has yet been devised to keep desert sand on the desert and not in the trailer.

One thing, the desert with its weird buttes and fantastic monuments and everchanging colors provides Julie with plenty of material for her sketchbook. Sometimes, Julie and her sketch pad go into the field with Leo where she often winds up, however, as assistant geologist.

**JACK JONES, deputy chief, GJEB, flies into East Carrizo for first-hand look when developments in drilling suggest change of plans. Leo, in camp that day, meets plane, brings Jones up to date on new finds.**

# Flying Supervisor Saves Time

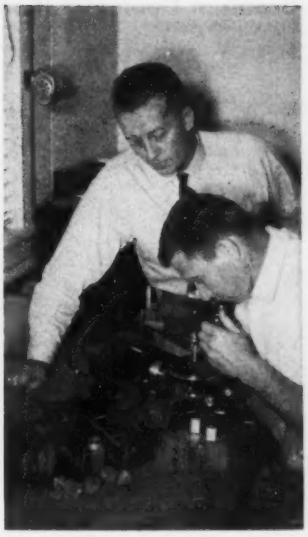
CONGRESSMEN, AEC TOP BRASS, technical consultants, foreign VIPs (allies only, and carefully screened), but mostly GJEB personnel, save countless hours by flying between exploration projects. For instance, East Carrizo is 324 kidney-jarring miles by road from Grand Junction: it's only an hour by air as the plane flies. Flying makes a four-hour inspection trip out of what otherwise would be a two-day expedition. That's important to GJEB supervisors who must keep informed first-hand of new developments and be available to advise field men scattered over 130,000 sq. mi. of incredibly rugged country.

Most AEC camps and many private mining companies have their own airstrips. Despite the rough terrain, finding enough level (or nearly level) ground for a strip isn't hard. Summer brings the real headache. The air is thin enough at the average elevation of the airstrips, but when warmed by the summer sun, it gets too thin to lift the plane safely off the short runways. If you fly in the summertime, you take off before 7:00 am.

**AT DRILL RIG, Jones talks things over with geologist, gets views of drilling contractor's men.**

**CORES are examined with hand lens and scanned with geiger as Jones, Garcia and Leo talk things over.**

JULIE WAVES as Leo boards plane for Grand Junction and a day's work with equipment unavailable at camp. Leo would lose two days traveling by car.



LEO USES the lab microscope to identify some unusual field specimens.

# Flying Geologist Has More Help

FLYING BRINGS the facilities of Grand Junction much closer to the points where they are really needed —in the field. Where practical, both in cost and maintenance, equipment is installed at field camps. What cannot be taken into the field is only a short flight away. When necessary, Leo and the other geologists can make a quick trip back to Grand Junction to do some microscope work on a particularly baffling specimen; to check newly found "hot" samples on the laboratory scaler which is far more accurate than field counters; or to help the boys in photogrammetry furnish a map of a new discovery area as quickly as modern equipment will permit.

Sometimes, after their 10-day tour of duty in the field, the men can catch a plane ride back to spend their days off at "the Junction." Although air transportation is relatively inexpensive, flying is kept to a minimum, not only to keep costs down but to minimize hazards.

The AEC now has its own planes for airborne exploration, but transportation by air is handled by a private charter service.

LEO CHECKS assays of recent samples which Jim Bartos ran through accurate electronic scaler for him.

LEO HELPS photogrammetrists Spann and Platt identify aerial photos for map of area where he's working.

SCINTILLOMETER-CARRYING PLANE is guided over sandstone rims by Leo's radio. The plane covers lots of almost inaccessible ground in a short time, picking up radioactive anomalies for later ground investigation.

# Tools of the Trade

IN AN AEC CAMP, you can't throw a rock without hitting a geiger or scintillation counter of some sort. All depend on uranium's peculiar property, radioactivity. These basic instruments are indispensable, and for special jobs there are special adaptations.

Take the airborne scintillation counter (above). AEC now has three planes so equipped, each with a team of specialists; pilot, observer, and follow-up geologists on the ground.

Then there's the drill hole scintillation counter. It spots radioactive zones in holes punched down dry by wagon drills. This eliminates core drilling down to about 120 ft., not only cutting costs but saving water which is plenty important in desert country.

While operating this equipment is the job of the Research Section, Leo becomes familiar enough with it to better capitalize on the help it can give him.

AL TAVELLI, research chief, GJEB, shows Leo how scintillation counter is mounted in AEC's Super Cub.

LEO LEARNS how jeep-mounted gamma ray unit is used to log drill holes, often eliminating need to core.

STRIP LOGS are printed at field office for immediate use by field men. Jim Clinton demonstrates.

**Leo Starts Out Early . . .**

There's lots of daylight in northeastern Arizona, especially in summer, and field men take advantage of it.

**. . . And Sometimes Works Late . . .**

Leo finds he can save time in the field by doing some sketching at night while Julie dries the dishes.

# Camp Life

MOST OF THE FIELD CAMPS are surprisingly lively. Frequently drilling contractors as well as AEC men bring their wives into the field. Picnics like that at right, trips to points of interest in the neighborhood (anything within 200 mi. is the neighborhood), sports events like horseshoes, and mountain climbing make up most of the recreation.

Some of the wives spend only the summer in the field; some only go out for a few weeks; but many, like Julie, spend most of their time there. Occasional trips to Grand Junction or Denver are lots of fun but Julie is always glad to get back to the dungaree set.

**. . . But It's Not All Work**

Frequent picnics like this one make life pleasant for all in camp.

# And Finally . . .

WHEN LEO TURNS OVER the project report to GJEB Chief Tom Oster (right), the AEC has a geologic picture of the area, an estimate of potential tonnage and a recommendation of how much drilling should be done to prove reserves.

The Exploration Section takes over after GJEB supervisors approve drilling recommendations. Drilling contracts are opened for bidding and access roads are built. Drilling varies for different projects. In the Shinarump, where ore occurs in channels of ancient stream beds, "fences" of holes across the bed give maximum information. Where ore occurs in "rolls" in the Morrison, a grid pattern is best.

From cores and gamma ray logs, geologists can make an estimate of ore tonnage in the area. Although private companies do the mining, the report helps the Commission plan mill sites, roads and the overall operations. Equally important, the final report adds to the geologists' knowledge of uranium.

AEC geologists know that finding uranium will get harder, but on their record, you have to share their optimism about the future.

A NEW CLASS registers every Monday morning at the clubhouse at Hibbing during the four-months' period. Many have met each other on the Range before. Others, through common interests, speedily get acquainted.

# School for Diesel "Know-How"

**Top efficiency, high availability sought for open-pit mining equipment through on-the-job training for key personnel.**

THE SCHOOL STARTS OFF with lectures and movies. By mid-afternoon, however, this group, working in two-man teams, has torn down, studied and rebuilt limiting and variable speed governors—the engine's mechanical brains.

ONE OF THE LONGEST and most intensive field service schools ever offered in diesel engine operation and maintenance ended last month when General Motor's Detroit Diesel Engine Division completed a four-months' series of courses on the Mesabi Range in northern Minnesota.

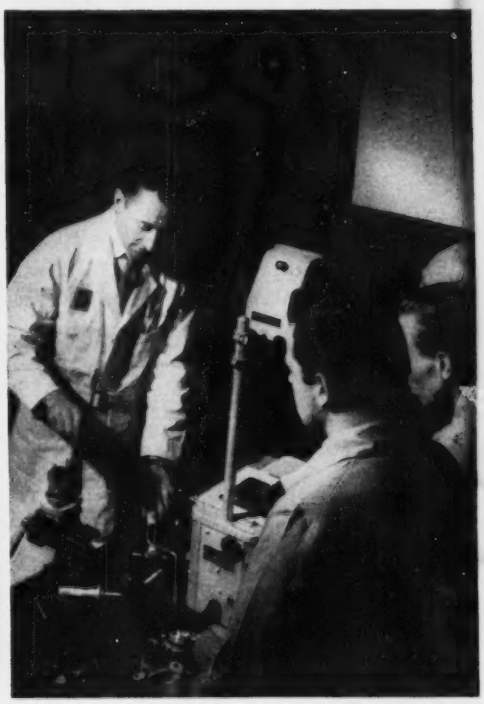
Early in January supervisors and mechanics, charged with keeping mining equipment operating at top efficiency, started leaving their jobs to attend the one-week courses set up by the division.

Classes were held in the Municipal Golf Clubhouse in centrally located Hibbing. Here over 8 tons of training equipment, valued at $50,000, had been assembled. Two factory-trained instructors were on hand to conduct the school.

Enrollment each week was limited to 12 men who broke into groups of six for laboratory sessions. This gave each trainee ample opportunity to take part in the dis-

**PROPER OPERATION AND MAINTENANCE** of the engines that power these heavy-duty giant trucks is the goal of Detroit Diesel's field instruction program. This is conducted by two factory-trained instructors.

**AFTER PUTTING A UNIT INJECTOR TOGETHER,** the trainee applies a simple test to see that it is working properly. The injector times, measures, pressurizes and atomizes the fuel.



**OVERHAULING A FUEL PUMP** is easy, once you know the right technique. After the instructor describes the proper procedure, trainees learn how the job is done by doing it themselves.

A FUEL PUMP HOUSING comes in for extra discussion. Enrollment in each class is limited so that the individual attention of the instructor is always available.

TUNE-UP PROCEDURES assure maximum performance and longer engine life. Working on a live engine, these men learn how to make sure it is delivering the proper power.

IN THE TROUBLE-SHOOTING LAB, the instructor has fouled up this live engine to simulate conditions that might arise. By using proper testing equipment, trainees find out what is wrong, make necessary adjustments.

mantling and reassembling of almost every section of the engine, including the torque-converter.

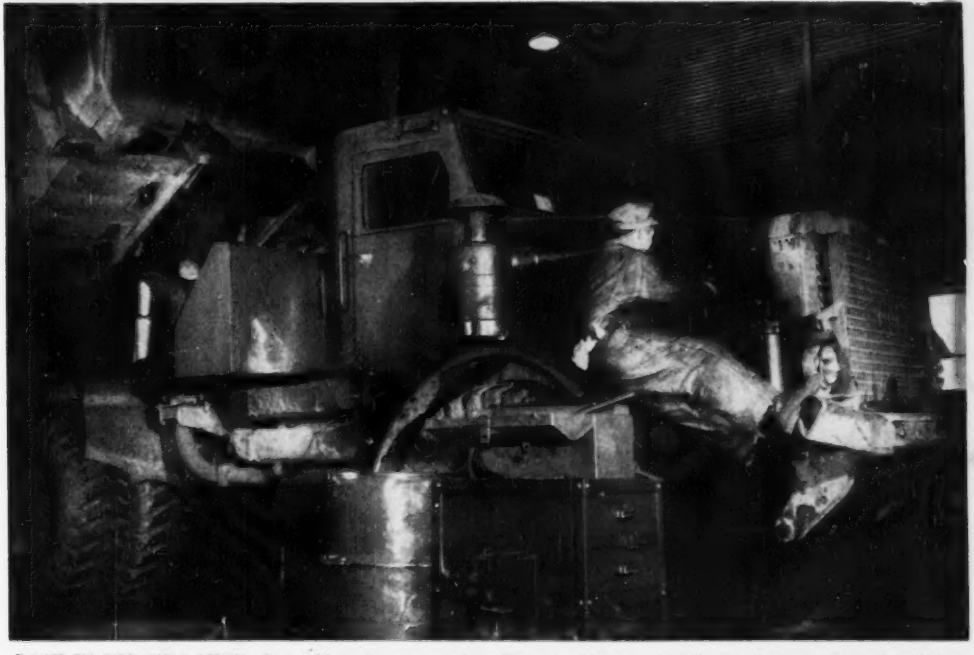
While lectures, movies and slide films were used, emphasis was placed on "learning by doing." Each "lab" session covered the function, operation and proper maintenance of whatever part was being studied. Saturdays were devoted to discussing the individual operations of the trainees.

T. L. Guarniere, Detroit Diesel's service training director, worked closely with the mining companies in planning the material to be covered. In this way a course that met their specific needs was set up.

In the four-month period, 250 men representing over 40 companies on the Mesabi were given the course. The scope of the training the men received is graphically told in the accompanying pictures.

ITS ROOTS-TYPE BLOWER is vital to the GM two-cycle diesel engine. Here three teams learn the proper procedure for an overhaul by actually doing the job under expert supervision.

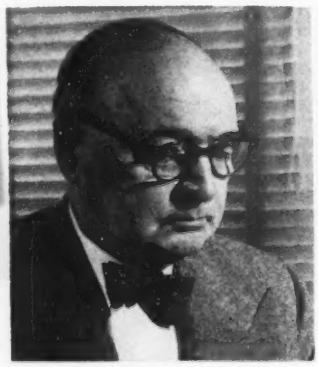
**TORQUE-CONVERTERS** come in for study. With three men on a team, converters are torn down and rebuilt. Trainees learn what makes them work and what service they need to give the desired results.



**BACK IN HIS OWN SHOP** after taking the course, the graduate puts his newly acquired knowledge to work. He saves his company time and money through a better understanding of the two engines that power this truck.

SHINY POWDERED COPPER, 99.9+% pure, meets standards for oxygen-free high-conductivity metal. By established techniques of powder metallurgy, it can be made into shapes of copper or its alloys.[1]

# Is the Chemico Metals Technique

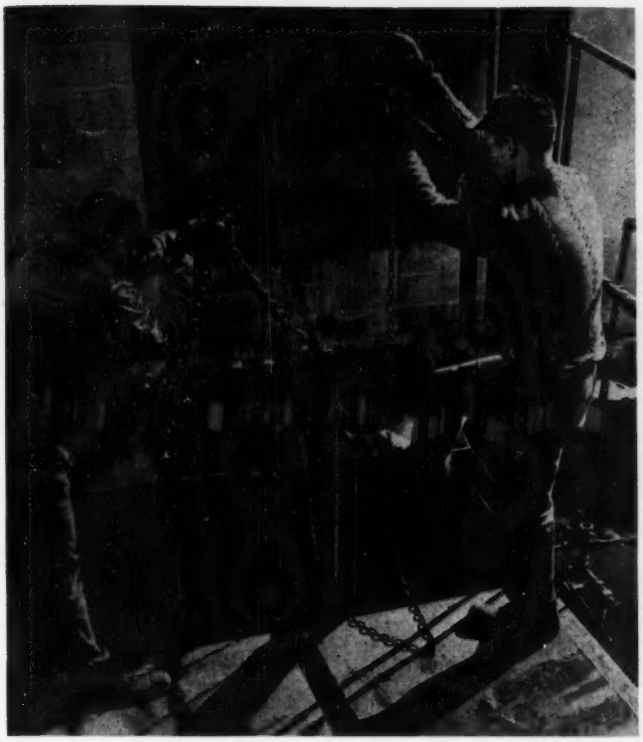


MAJOR GENERAL WILLIAM N. PORTER, president. The new process will be tried commercially this year.

EDWARD S. ROBERTS, vice president and chief engineer, noticed pure copper near an ammonia scrubber.

DR. LUDWIG J. CHRISTMANN (American Cyanamid Co.) saw use for cheap ammonia in metallurgy.

**↑He gives credit . . . . . to these men for development of the**



BY A CONTINUOUS CHEMICAL process, this copper scrap yielded powder like that shown on left. Refining of sulphide concentrates is similar.

# Tomorrow's Metallurgy?

PATRICK J. McGAULEY, chief of metals department, extended the application to sulphide ores.

## new process:

HOWARD L. WALDRON
Associate Editor

NOW BEING BUILT are three new plants which will use chemical leaching techniques for refining sulphide concentrates containing cobalt, nickel and copper. The total plant investment comes to about $24.5-million. Until May 16, except for broad hints as to their nature, the processes were secret.

1. All photos are from Chemical Construction Corp. Those of process were taken at Chemico's pilot plant in Linden, N. J., and show steps in the newly developed copper-scrap process.

2. Chemical Construction Corp. (Chemico), a subsidiary of American Cyanamid Co., is an internationally known firm which designs and builds chemical plants for the heavy chemical industry. The company owns numerous other processes including those for the manufacture of sulphuric and nitric acids, synthetic ammonia, methanol, formaldehyde, and phosphoric and nitrogenous fertilizers.

But on that date, Major General William N. Porter, president of Chemical Construction Corp.[2], released the following information.

The leaching techniques—there are several, each tailored to the needs of the ore or material being processed—take advantage of two chemical variables which have seldom been controlled in large-scale hydrometallurgy. They are pressure and temperature.

Proper control of pressure and temperature (along with other controls) is used throughout the process. The result:

- In leaching, the sulphide ores can be oxidized in a slurry just as surely as they would be oxidized by roasting in air.
- In precipitation, the controls allow for selective reduction of the metals. So the products are pure, separate, metal powders.

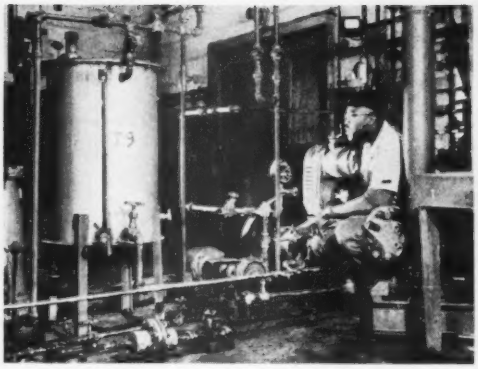
### Process is Simple, Continuous

Briefly, and in a general way, here's how the technique can work on a cobalt-copper-nickel ore:

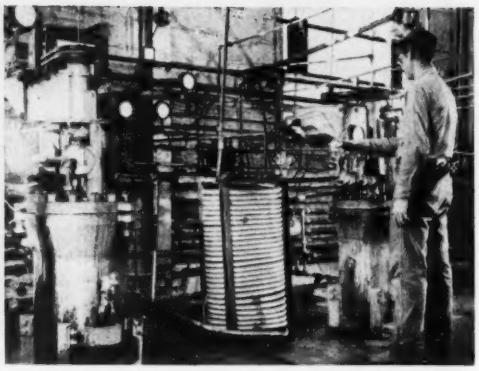
1. Concentrate is leached under pressure in an autoclave in either an acid or basic solution. (These autoclaves are high-temperature, high-pressure reaction vessels, equipped for agitation, injection of gas, and continuous input and exit of gases, liquids and solids.)
2. The resulting slurry is filtered into a solution which contains the metals and a cake-tailing which contains insolubles and gangue.
3. The metal-containing solution is reduced—in an autoclave at high temperature and pressure—by hydrogen gas. Control allows selective, separate precipitation of the three powders.
4. The cobalt, copper and nickel powders are washed and dried for sale. The solution from precipitation goes to circuits for the recovery of reagents and/or byproducts (such as ammonium sulphate).

**Application.** Gen. Porter specifically mentioned the refining of copper, cobalt, nickel, and manganese ores; and scrap of copper and brass. Regarding limitations of the process, a Chemico spokesman said that Chemico's metallurgists are not prepared to reduce metals above zinc in the electromotive series. And he added that "the electromotive series is very important in the process."

Here for your reference are the common elements in the electromotive series. They are in descending order of activity from left top to right bottom, and are in two



FILTRATION separates solids (insolubles) from metal-containing solution. Filter is behind workman.



REDUCTION takes place in autoclave. Coils (center) return heat from outgoing to incoming solution

**"The era of chemical refinement of metals is just beginning." Gen. William N. Porter**

groups according to Chemico's present stated limitations:

| Not Workable | These May Be Workable | |
|---|---|---|
| Lithium | Zinc | Hydrogen |
| Potassium | Chromium | Antimony |
| Sodium | Iron | Arsenic |
| Barium | Cadmium | Copper |
| Calcium | Cobalt | Mercury |
| Magnesium | Nickel | Silver |
| Aluminum | Tin | Platinum |
| Manganese | Lead | Gold |

(Manganese, you will note, is above zinc but it is produced only as the oxide, not reduced.)

"Although we have conducted extensive fundamental research and development work on these techniques in a considerable part of the field of metallurgy," Gen. Porter said, "each commercial application requires specific technical adaptation."

**Plant Cost.** "Material requirements are so moderate in quantity and reasonable in cost," according to Gen. Porter, "that . . . plants may, in many cases, be built at the site of the mine, or in the case of scrap recovery plants, in each large industrial area."

**Production Cost.** Comparing the technique with conventional methods, Gen. Porter said: "Our piloting experience has shown that production costs, from ore concentrates or low-grade scrap to pure metals or their oxides, should be considerably lower.

**Use of Powders.** Gen. Porter pointed out that pure powdered metals available in large quantities open new fields of metal forming and working: Producers may now consider the cold pressing of large tonnages of powders into billets, ready for extrusion into rods, tubes or shapes. Also, they may consider continuous melting of powders into rods or tubes, or continuous casting of powders into forms for further fabrication.

## In 1934—An Observation

In outlining the history of the metals process developed by Chemical Construction Corp., Gen. Porter cited three men who played key roles in the technical development: Mr. Edward S. Roberts, vice president and chief engineer; Mr. Patrick J. McGauley, chief of the company's metal department; and Dr. Ludwig J. Christmann, of Cyanamid's research laboratories at Stamford, Conn.

It all began in 1934 when Roberts, while working in Italy, found that almost pure copper was deposited under certain abnormal conditions around the carbon-monoxide exit of an ammonia-recovery scrubber.

In 1940, Roberts suggested that Chemical Construction Corp. investigate a process which would permit production of much cheaper ammonia. After discussing the proposed process with Roberts, Dr. Christmann, then director of Cyanamid's Stamford laboratories' basic nitrogen division, made a detailed report on possible uses for cheap ammonia. Several of these were applications in metallurgy, including leaching of copper ores.

## In 1945—A Project

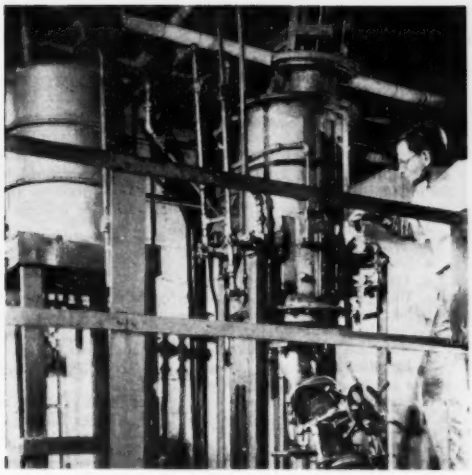
In 1945, when Roberts became chief engineer, he remembered the copper in Italy and the cheap ammonia. There was launched a research project in inorganic chemistry that resulted in the new processes.

In 1946, McGauley, an experienced metallurgical engineer, joined Chemico to work on the metals investigation. McGauley's research extended the application of the process to sulphide ore. He is credited with solving some of the most difficult problems which had blocked the progress of the development to that time, including an acid leaching and reduction process for copper ore which had been developed and which resulted in an end product that was better than 99.9% pure, with virtually 100% extraction. Further elaborated by Felix Schaufelberger and other Chemico men, this work established the fundamental technique for the separate recovery of pure nickel and pure cobalt powder from leach solution.

Through this research, Chemical Construction had developed the basic technique of the processes for acid leaching and the reduction of pure metal powders from the sulphides of many nonferrous ores.

## Today—Application

In December, 1948, Sherritt Gordon Mines, Ltd., asked Chemical Construction for advice on a process developed for them by Professor Frank A. Forward, head of the Department of Mining and Metallurgy of the University of British Columbia. With the Forward process, copper, nickel, and cobalt were to be leached directly from finely ground sulphide concentrates with



WASHING TANKS receive copper powder as it comes from autoclave. Powder then goes to simple box filter.

ROTARY DRYER produces the finished copper powder. Commercial installations will use continuous flow.

strong aqua ammonia and oxygen; the nickel was to be recovered as an oxide.

Chemical Construction's engineers found that some of their techniques could be combined with those of Professor Forward to produce nickel metal as the end product and at the same time reduce the production costs. This led to a continuing, close relationship between the two firms.

In accordance with the development contract between the two companies, Sherritt Gordon with the assistance of Chemical Construction engineers installed and operated a pilot plant to develop the ammonia leach in the buildings of the Mines Branch of the Department of Mines and Technical Surveys at Ottawa. At the same time, Chemico at its pilot plant in Linden, N. J., and Cyanamid's laboratory at Stamford, Conn., developed the production of pure nickel powder from the nickel salts produced at Ottawa out of purified leach solution.

Later, Sherritt Gordon constructed a demonstration plant in Ottawa, to complete the piloting of their own leach process along with Chemico's processes and to promote these developments in Canada.

From December, 1949 to June, 1950, Chemical Construction conducted research on the cobalt-copper-nickel concentrates from National Lead Co.'s Fredericktown mine. This work led to improvement of the technique for separating nickel and cobalt and also proved that the basic process already developed by Chemico should solve numerous problems which could not be solved economically by conventional metallurgy.

Another research project, starting in August, 1950, resulted in adapting Chemical Construction Corp.'s processes to the special needs of the Howe Sound Co., which was faced with the difficult problem of eliminating high arsenic in its cobalt concentrates.

## Chemico, Chemetals, Sherritt

Meanwhile, Chemetals Corp. was organized in December, 1949 by William M. Hayden and a group of men connected with the mining and metals industry. Its purpose was to develop in collaboration with Chemical Construction Corp. the Chemico Metals Technique as applied to copper scrap and brass scrap and blister copper, and to market the process commercially throughout the world by means of sub-licensing. For this purpose Chemico granted Chemetals an exclusive license in the United States, Canada, Mexico, and the United Kingdom, and preferential rights elsewhere.

After successful piloting, Chemetals in collaboration with Chemico has just finished a series of demonstration runs in which copper powder equivalent to electrolytic grade copper was produced.

"Chemetals Corporation," Gen. Porter says, "recognized that with the volume of copper and zinc contained in old and new scrap increasing . . . with the years, the tonnage recoverable under this newly perfected process could be compared with major domestic mining operations. By utilizing this process, contaminated copper and zinc heretofore wasted due to difficulties in refining can now be freed."

Chemetals Corp. has also been collaborating with Chemical Construction Corp. since September of 1950 in the development of a technique evolved by Mr. L. N. Allen of Chemico to produce a sintered manganese-oxide product from low-grade domestic ores.

Rights to many of the processes are shared by Chemical Construction Corp. with Sherritt Gordon Mines Ltd. Starting in 1948, Sherritt had contributed to the entire project by support of parts of the research program, by developing new processes, and by building and operating the pilot plant at Ottawa.

## Howe Sound's Cobalt Plant

First commercial use of one of the processes will be at Garfield, Utah. In July, Howe Sound Co. expects to begin tune-up of its new $2.5-million Chemico-built cobalt refinery.

It will process cobalt concentrates from Howe Sound's Blackbird mine at Cobalt, Idaho. About 1,000 daily tons of ore will yield three flotation concentrates: copper, cobalt, and iron. Copper will go to conventional smelting.

*(Continued on page 176)*

## Factors Used in Advanced Mine Design

**1. External Factors.** These control access, location and type of surface construction required. They may be determined by observation and by mapping.

a. Transportation facilities.

b. Topography as it may affect tunnel or shaft locations, open-pit operations, drainage, and location of plant and storage for supplies, product and waste.

c. Ownership of surface rights and their value.

d. Climate, and appropriate type of construction, seasons when transportation and construction are easiest.

**2. General Factors.** These may exert distinct control on many phases of design. They must be sought out.

a. Market for principal and byproduct minerals.

b. Availability and delivered cost of power, timber, water, waste fill, other supplies, and equipment

c. Economic status of the area, type of labor available, wage scales and living costs.

d. Housing, school and recreational facilities.

e. Financial condition of operating company.

f. Political factors and governmental restrictions.

g. Taxes and manner of assessment.

h. Insurance and compensation laws.

**3. Dominant Features or Geometry of the Mineral Deposit and Enclosing Rocks.** These control major outlines of underground layout. Models will illustrate them excellently. They may be determined from core drilling.

a. Size, shape, dip, rake of deposit.

b. Type and depth of cover.

c. Depth of water level.

d. Presence of multiple deposits.

e. Unit value (grade) of deposit or deposits, and distribution of value, including low-grade sections that may be maintained intact for later exploitation.

f. Sharpness of cutoff between valuable and waste rock.

g. Regularity of deposit, presence of pinches or swells, offshoots of valuable mineral, offsets by faulting.

h. Structural environment; for instance, massive beds adjacent to shales, competent intrusives in weak rocks, folding.

# Why Not Predesign Underground

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THE NEED FOR DESIGNING MINES in advance of underground work, just as any industrial plant is designed before construction starts, continues to mount as development costs and working depths increase and grade of ore in deposits declines.

The goal of "designing" is to form a broad plan for a whole mining operation, with each part proportioned to the whole. We want what we want, when and where we want it, and at a cost reasonably estimated.

The data for design of mines are harder to obtain and to interpret than those for an industrial plant. A large part is obtainable from core drilling and should be collected systematically while drilling progresses. This information will be added to that obtainable from all other sources and will be used for the following purposes:

1. To select and lay out the most appropriate stoping method.

2. To design gathering, stope ventilation, stope access facilities.

3. To design mine transportation and ventilation, including shafts and levels.

4. To estimate all costs.

5. To schedule the most logical development program and to gear the surface construction to it. Circumstances attending the development of the new gold field in the Orange Free State highlight the case for advanced design.

The proposed means for designing a mine were conceived in stopes and at drill sites. Similar ideas have been used to design a number of mines, among which may be mentioned those of East Sullivan Mines, Ltd. Bourlamaque Township, Quebec, and Quemont Mining Corp. Ltd., at Noranda, Que. Related reasoning was used recently in developing a large copper orebody now in smooth production. A partially similar procedure is used in estimating costs for developing and operating coal mines.

### Where the Procedure Proposed Can Be Applied

Most of our large mineral deposits are explored by core drilling. The ideas presented are applicable to deposits which may be so explored. In the case of deposits which cannot be thoroughly explored by core drilling, because of their erratic nature, the proposed procedure may be applied negatively in that plans for stoping and development must be simple, flexible, and initial investment must be low.

These ideas were developed for underground metal and nonmetallic mines. Suitably varied, they may be applied to any undertaking which involves underground excavation, support or transportation.

Application to single orebodies of uniform material in uniform rock is simpler, but complex problems may be resolved into a number of units to be treated separately up to a final logical integration.

### What Are the Basic Data?

The basic data needed by an engineer to design a mine in advance of underground work are an extension of those which are used in selecting a mining or stoping method. Discussion of this topic has been a favorite subject throughout mining literature.[1] The most complete listing of these data is believed to be that published by Robert K. Warner,[2] and the fullest use of it has been made. The appendix offers an outline of this information, and comment on it.

An alert engineer with sound mining experience and a real acquaintance with core drilling can obtain much more of the needed data than is generally realized. Some of the data can be obtained only as drilling progresses. Drill runners can help outstandingly.

As examples of what may be done, beyond usual practice, the following points are emphasized:

[1] Hoover, Herbert, *Principles of Mining*, pp. 58-124, for example.

[2] Warner, Robert K., "Selection of a Mining System," *Trans. AIME*, Vol. 109, 1934, pp. 11-24.

**4. Physical and Chemical Character of Deposit and Surrounding Rocks.** These factors control or influence competence, subsidence, ease of drilling, breaking characteristics, means appropriate to handling, need for ventilation and pumping. They may be determined or approximated by core drilling.

a. Rock types.
b. Type and extent of alteration.
c. Weaknesses, such as bedding, schistosity, consistent mineral cleavage, faulting, jointing, cavities, and the spacing, regularity or pattern they show.
d. Weaknesses along walls of the deposit.
e. Tendency of valuable mineral to produce rich fines or mud.
f. Tendency to pack or be sticky.
g. Tendency to oxidize and heat or adversely affect treatment or use of product.
h. Tendency to "air slack."
i. Presence of "swelling ground."
j. Abrasiveness.
k. Silica or silicate content.
l. Temperature and gradient.
m. Water occurrence, porosity and permeability of deposit and surrounding rocks, corrosiveness and turbidity of water, its occurrence in pores, in joints, in occasional fissures, channels or pockets, and the interconnection of water-bearing openings.
n. Ease of drilling.

**5. Treatment of Mine Product.** This determines net recoverable value and one component of the cost of the final product. It, therefore, limits the means which may be employed in development and production. It may restrict the type of mine product or require several products. Treatment may be determined by laboratory study of core or assay rejects.

a. Processes to be used, operating and plant costs, net recoverable value.
b. Possibilities of separating waste or valuable mineral early.
c. Desirability of uniformity in value or in physical properties to increase recovery in treatment.
d. Undesirability of contaminants, as wood chips in crude asbestos.
e. Undesirability of fines, as in lime for burning.
f. Necessity of handling more than one type of mine product.
g. Possibilities of cheap recovery from low-grade mine product, as by heap leaching or leaching in place.

# Mines?

1. Record where drill rods "float" as a very simple and definite indication of tight ground.

2. If severe water problems are anticipated, it may be desirable to record water levels and changes in them, to check recovery of drill water, and to make porosity, permeability, and possibly pump tests in the manner familiar to petroleum engineers and dam designers.

3. Record all core loss and, as far as possible, determine its cause, obtaining information from sludge or core particles, drill operation, and opinion of drillers. A gouge seen along vein walls may be of great importance, but difficult to core. Its presence may be indicated by relief of rod pressure, mudding of the bit, jump in motor speed, or slickensides and parallel breaks in adjacent core.

4. Record drilling progress in various rocks with notes of average footage per shift or average time required to run out 1 or 2 ft. Mechanical recorders, like those used in oil drilling, may be employed on hydraulic or "rotary" type drills.

5. Note and record bit footages in various types of ground.

6. Illustrate structural and physical information on models.

7. Study minutely and record all data on the physical character of rocks and ore. If all core is sent for assay, logging will be particularly vital. If core is to be split, it ought to be split in such a way that physical features are not destroyed; say, by diamond saw.

8. Laboratory study of various kinds may be appropriate. Laboratory study of rock properties should become of increasing usefulness. However, experience, judgment and a keen awareness of structural conditions will be needed to take samples properly and interpret the results. Results of physical testing at Rifle, Colo. have been generally confirmed by underground work.

9. Drillability with rotating bits often does not correspond to drillability by percussion. However, if rotary drilling is carefully observed, and if physical character of rocks is taken into account, and analogies studied, the drillability by percussion may be approximated closely.

10. It may be vital that core rejects, whether from samples sent for analysis or split core or both, be saved for metallurgical study.

11. Other lines of investigation appropriate to each case should be given weight as to importance.

## Selecting the Stoping Method

The fundamental unit of design is the place where rock is to be broken from the solid state. This should be shaped first, and other workings logically proportioned.

The geometry or other conditions may indicate a new stoping method, a novel combination of several methods or the significant modification of a tried method by the use of new equipment. Results achieved by the U. S. Bureau of Mines at Rifle are an eloquent example.

Selection of stoping method will be made by systematic elimination of methods not applicable. Prime factors to be considered always will be the dominant features of the orebody: its geometry, the physical and chemical character of the ore, walls and cover, and limits imposed by net recoverable values. Each case will present a number of factors which will be critical in selection of a stoping method. For example, shrinkage stoping may be discarded for mining a sulphide body which oxidizes, one with rich offshoots, one which tends to pack, one with too low dip, or one of definitely slabby structure. If any of these conditions is present, shrinkage is out, even though all other conditions seem to favor it.

After all factors pertinent to a given case have been critically applied to a complete list of stoping methods, few of them will remain as possibilities. A very close scrutiny of each of these remaining methods will now be made. Each of these possible methods will be adapted with the greatest of care to fit the conditions at hand. The size of stope units may be determined from careful study of all physical features. The daily production to be anticipated from each type of stope and respective stoping costs may be estimated. Even though the stoping costs are only a part of the total production cost, it should now be possible to approximate the optimum daily production and to determine the number of stoping units needed.

With stoping costs and the number of stopes roughly calculated, one stoping method should emerge

as most desirable. If not, then the following steps will be taken with the alternatives in mind and all work planned with each alternative provided for, until a definite choice can be made. This is not as difficult as it may seem, because alternatives are likely to be similar and to require similar layout.

## Designing the Ore Gathering, Stope Ventilation and Access

Let us now make a review for all physical factors which affect fragmentation and stope layout: Some materials, like coal, or iron ore at the Bennett mine, on the Mesabi Range, and the Sherwood mine, on the Menominee Range, are soft or sufficiently fractured to break fine. Such material may be directly loaded on shaker or belt conveyors. Ordinarily, it is necessary to pass material over grizzlies, break it at draw points in slusher drifts, or provide unusually large loading and haulage equipment. If daily tonnage, reserves, and wages range from moderate to high, it will be logical to use a crusher for most of the breaking.

Gathering should be laid out to minimize or eliminate sloppy drifts, loss of fines, chute repair, hung chutes, loading delays and the cost of stope preparation. It must also be considered in regard to stope ventilation and access.

Stope ventilation will take account of rock temperature, the amount of silica or silicates in the ore, the moisture in the mine air, and the method of handling ore. High silica content, low moisture and slushing are a bad combination which calls for excellent stope ventilation in the mine.

Access to stopes must be provided for the appropriate number of miners and their supplies and equipment. Access deserves extraordinary consideration because of its big effect on safety, supply delivery, supervision, travel time and stope ventilation.

When the above facilities are laid out, the entire stope unit should be reviewed and possibly revised. It will generally be worth-while to prepare models of single stopes or stope blocks showing geological controls, and grade of ore. The cost of stope preparation may now be primarily estimated from the data thus far assembled.

A mine model on which all large-scale geological structure is shown will greatly assist in laying out shafts and levels. This should be so closely related to original data that competent and incompetent ground, locations where water conditions may be good or bad, and other needful information will be evident.

Level location and interval may be determined to suit stope height and also the needs of access and ventilation.

Relative merits of hauling by truck, conveyor, shuttle car and rail, with all the variations and combinations considered, should be studied to select the most suitable haulage equipment. Adjustment will be made between the size of material expected to be handled from stopes, either with or without grizzlies, and the size of haulage equipment. Requirements for handling men, supplies, and probably waste rock will need consideration.

The sizes, grades and radii of curvature for haulages may now be determined to suit the needs of transportation equipment and need for handling drainage and ventilating air.

## Hoisting and Shaft Design

If rock to be hauled is suitable for hoisting at the desired daily tonnage, no underground crusher is needed. An attempt to hoist too large material will lead to irregularity, delays, and abuse of equipment. If underground crushing is chosen, a study of the amount of ore available on each level, and the arrangement of the mine will indicate if it is logical to locate a crusher on each level or to use ore-passes and put crusher locations two or more levels apart. Under most conditions ore passes simplify haulage; if ore does not oxidize or pack, storage may be provided by them.

If temperature or temperature gradient is high, air cooling may be studied. Though it may not be needed at the outset of operations, some opinion of future needs may be formed and its effect on original development and ultimate costs estimated.

The design of shafts and their appurtenances is in itself a fine art. Very careful work has been done in South Africa and Ontario, and is interestingly recorded.[3,4] Factors to be considered in shaft design are depth, ground and water conditions; requirements for handling men, ore, waste, ventilating air, supplies and equipment, power, compressed air and water, and the timing required for them; requirements of additional shafts for exit and ventilating. The likelihood of future production increases may be very important.

The cage compartment or compartments of a vertical shaft merit special attention because of their function in handling men, supplies, and equipment. Men should be raised and lowered promptly and safely on a single deck, if possible. The cage should be large enough to accommodate supplies in "packages" or on flat cars. For "one-level mines," underground shops may reduce the need for hoisting and lowering large equipment.

In shallow mines it may be possible to decrease either capital or operating costs, or both, by using a belt conveyor incline with a track to handle both the equipment and supplies.

Location and layout of pump rooms and sumps, stations and dumps, crushers, storage and loading pockets may be completed or approximated after study of conditions appropriate to each.

## Planning the Attack

After all principal development work has been laid out, it remains to determine and schedule the most advantageous attack. It will be prudent to re-examine all the original data, studying those which have been used in making critical decisions, and checking the certainty of each. If some of these critical data are felt to be uncertain, development may be scheduled to check them with the least time and expense. For instance, if regularity of walls is not as certain as desirable, it may be possible to check this point by driving a sublevel or ventilation drift at less expense than a main haulage drift and without so much anxiety regarding line or grade. It may be prudent to sink first the least expensive of two shafts. If the deposit and the drilling are such that great faith may be placed in the original data, it may be logical to schedule entry by lowest cost or by shortest time before production. In most cases it will be desirable to tabulate several alternatives showing cost, time to complete, crew required at each stage, delivery of equipment, completion of surface construction, and completion of transportation facilities or power lines.

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[3] Various authors. *Journ. So. African Chem., Met. & Mining Soc.*, Dec., 1948, Feb., May and July, 1949.

[4] Province of Ontario, Dept. of Mines, "Investigations Regarding the Safety of Hoisting Equipment and Hoisting Practice in Ontario Mines," Bulls. 138, 138A, 1947-1949.

Strothart, A.B.C., "Mine Conveyance Safety Dogs," Bull. CIMM, Dec., 1950, pp. 675-677.

# How To Measure Retention Time in Flotation Machines

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FLOTATION TIME is important to mill men. Here is a way to measure the factor directly rather than calculating it from cell volume, pulp density, etc. At the London mill of the Tennessee Copper Co., the method was used effectively to compare retention times in the bulk rougher and scavenger circuits, and to compare average retention time of water and solids in the bulk rougher circuit.

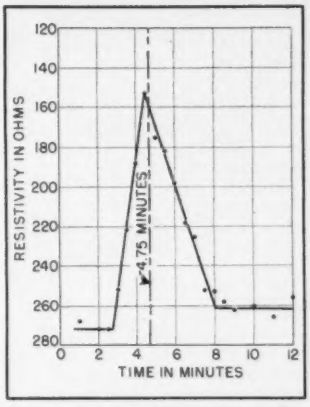



FIG. 1. Determination of retention time of water in bulk rougher circuit.

### To measure retention time of water in a flotation machine, here's what you do:

1. Quickly add a solution of NaCl to the head end of the flotation machine. Call this zero time.

2. Take tailings samples periodically after this zero time.

3. Filter the samples and measure the resistivity of the filtrates. A standard portable conductivity meter is all you need.

4. Plot resistivity in ohms inversely against time when each sample was taken, in minutes after zero time.

Figures 1 and 2 show results of tests made in the bulk rougher and the following bulk scavenger circuit at the London mill. Thirty pounds of salt was used. Feed rate of solids was 2200 tons per 24 hours with an average of 32.9% solids.

The plot is close to being a normal distribution curve. That is, when salt was added to the pulp, it spread, and the greatest concentration of salt was approximately at the center of the volume through which the salt spread. We found average retention time by drawing a vertical line so that the areas under the curve on each side of it were equal.

Actual results showed that the average retention time for the bulk rougher section was 4.75 minutes. For the bulk rougher plus the scavenger circuit, the average retention time was 7.0 minutes. Time lost in transporting the pulp from the rougher to the scavenger was 0.12 minutes, making the average retention time in the scavenger circuit, 2.13 minutes.

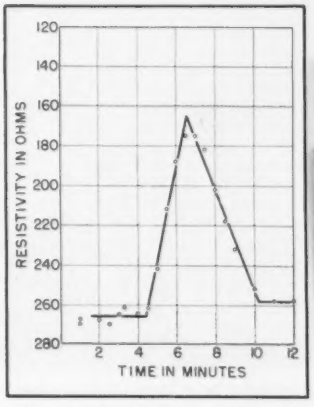



FIG. 2. Determination of retention time of water in bulk scavenger circuit and bulk rougher circuit.

### To compare average retention time of water and of minus 200 mesh solids, here's what you do:

1. Add NaCl and roasted minus 200 mesh copper concentrate to the head end of the rougher circuit. (In the London mill, copper was used as a tracer since there is not much copper in the ore.) Time of addition is taken as zero time.

2. Sample tailings at timed intervals after zero time.

3. Filter samples and measure resistivity of the filtrate.

4. Dry filter cake and assay for copper.

5. Plot resistivity of filtrate in ohms inversely, and copper content of the cake against time in minutes after zero time.

Figure 3 shows the results of tests at the London mill. Average retention time of the water was 5.5 minutes, and for the copper, 4.8 minutes. Pulp density in this test was 36.2% solids, hence the longer retention time compared to the previous test. The minus 200 mesh copper concentrate may have short circuited when it first entered the pulp, giving a shorter retention time of solids compared to water.

Use of a conductivity meter is preferred to chemical analysis of chloride ion in samples because it is quicker and is not influenced by interfering ions.

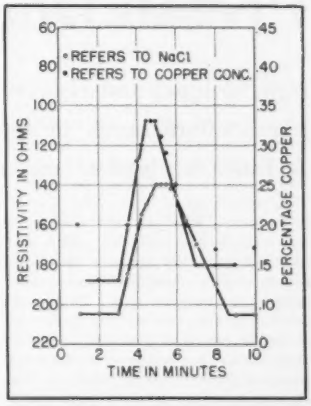
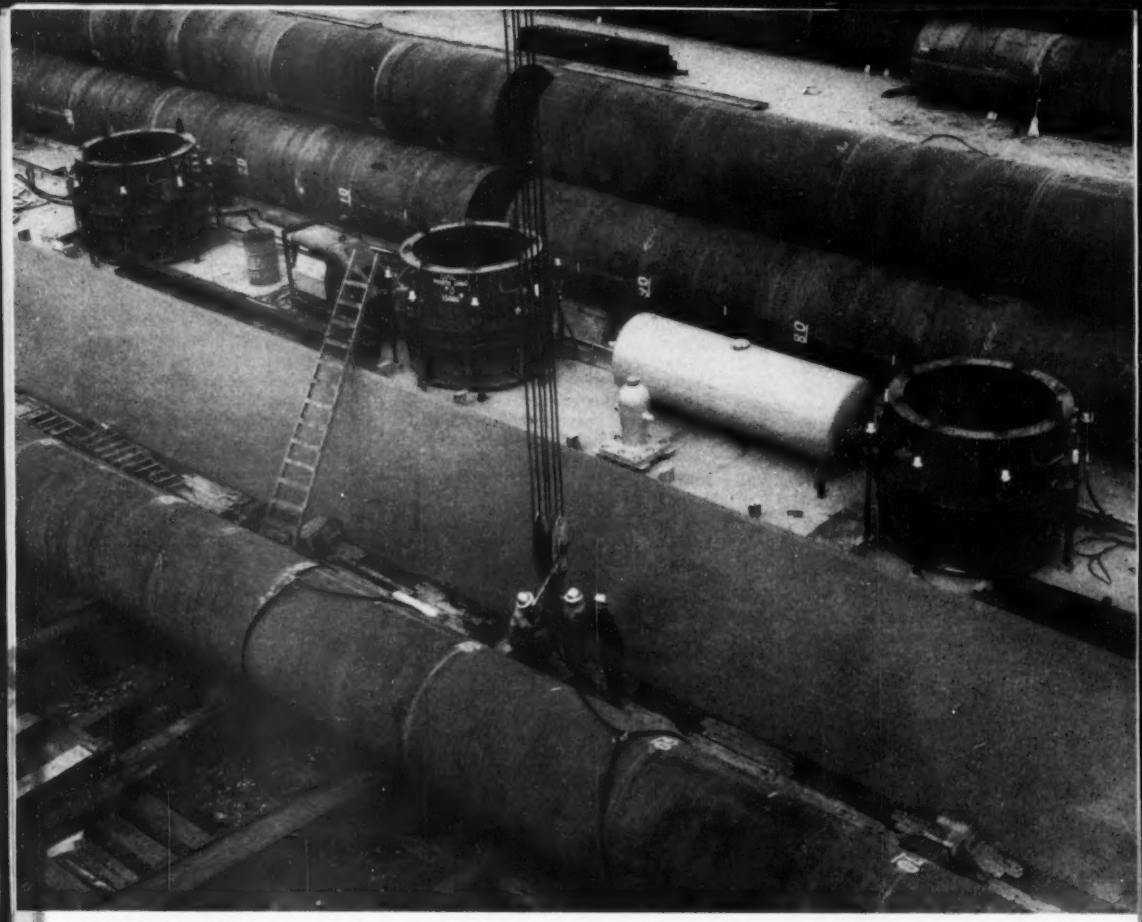



FIG. 3. Determination of retention time of water and of solids in bulk rougher circuit.



COMPLETED BARGE WILL BECOME A DOCK. Main parts include 6x100-ft. caissons which fit into wells near edge of barge over which are mounted air jacks (three shown) to raise barge to final position.

# Prefab Dock on Cross-Ocean Tow

**New, unique, and economical dock-construction technique offers much to speed up installation of port facilities for loading and unloading general cargo.**

SOMETHING NEW in dock construction which promises to speed the building of dock facilities has been invented — a prefabricated steel barge that can be towed by tug to its destination, across thousands of miles of ocean if need be. At the dock site, the barge drops round steel caissons through holes in the structure and proceeds to jack itself up to an elevation well above the ocean high tide or flood level of a river. With some welding and securing, the barge then becomes a dock fully fitted with mooring devices, and even tracks for traveling cranes or loading conveyors. This ingenious construction, in which the jacks play the most important part, has been tried in an Arctic installation where it successfully withstood rough buffeting by wind, wave and ice for more than a year. And today a similar dock-barge (shown on these pages) is being towed across approximately 3,000 mi. of ocean to be installed at the ore shipping point of the Orinoco Mining Co. on the Orinoco River in Venezuela. In fact more than ½-million sq. ft. of this kind of dock is now under construction.

The DeLong jacks upon which the success of this technique largely depends were invented by Col. Leon B. DeLong. He is head of DeLong Engineering & Construction Co., of New York City (also Decco International) which is now handling construction and engineering of the docks going to the large mining project and others. Present units are being built in the construction yards of Consolidated Western Steel Corp. at Orange, Tex. George E. Suderow is the chief engineer for

LOADED BARGE carries caissons, crane, power launches, air jacks, compressors and receivers, and other gear.

TUG AND BARGE start out to cross approximately 3,000 mi. of ocean to Orinoco dock site which will constitute a major ore shipping point of the future. If desired, barge can also transport locomotives and freight.

# to Major Ore Shipping Point

the dock construction job. Joe Lucas is manager of the South American installation.

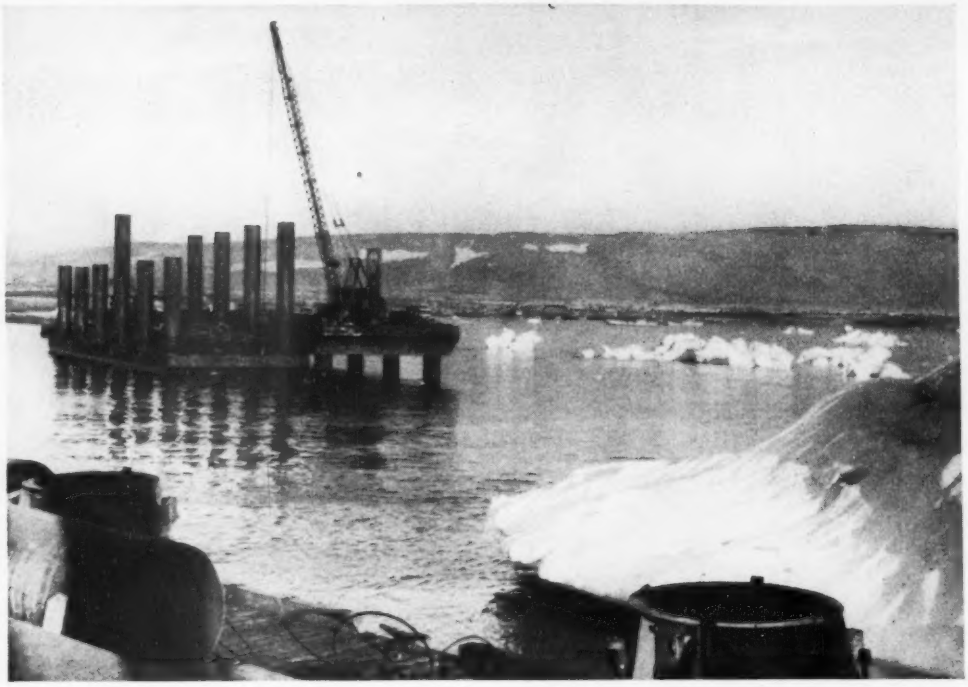
## The Voyage of a Dock

Here's the story of the dock that is now on its way. In the yards at Orange, Tex., the barge recently took shape as a huge longitudinally-framed structure measuring 377 ft. long, 82 ft. wide, 15 ft. deep, with ⅝-in. deck plate. It was subdivided into several watertight compartments to maintain safe subdivision in case of accident during towing. Steel-faced wells 6 ft. in dia. were built into the barge to receive caissons later on. Special patented DeLong jacks were mounted above each well. Steel caissons, 100 ft. long, 6 ft. in dia., each weighing about 40-tons, were also made. Finally the barge was fitted with oil and water piping, tracks for a traveling ore conveyor and mooring equipment. Material and workmanship of the barges were inspected by the American Bureau of Shipping.

Before the barge went on its long tow, it was loaded with caissons, a crane to handle the caissons, power launches, air compressors, receivers, piping, and other gear. If desired locomotives or other equipment not essential to the dock construction can be shipped this way.

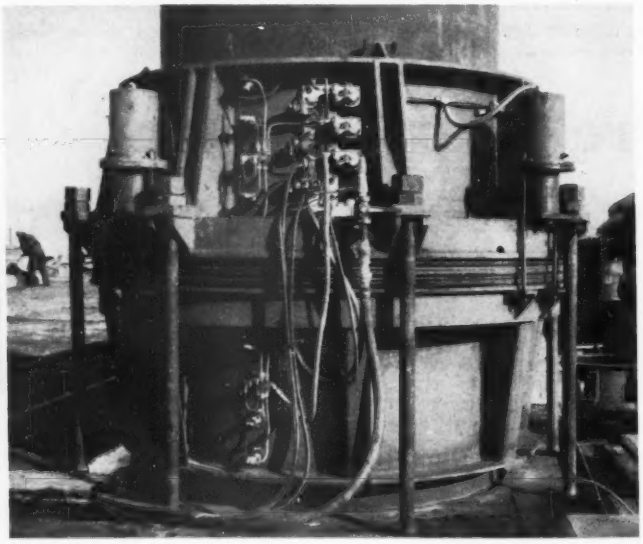
After all this cargo was fastened securely to the deck, the tugs took over. Barges like these prove very stable while afloat.

When the barge arrives at the dock site it will be maneuvered into approximate final position. Next a crane on the deck will hoist caissons, then lower them through the DeLong jacks and wells where they will be gripped temporarily into place by the jack grippers. Next the barge will be shifted into precise position and the caissons lowered until they hit bottom. Since they weigh about 40 tons each, they will readily penetrate any loose material on the bottom. With the caisson feet thus firmly—but only partially—anchored, the barge will proceed to lift itself out of the water through the ingenious action of the DeLong



## Early Arctic installation proves dock a success.

**1. BARGES WERE TOWED TO SITE. Cranes lift caissons, then lower them into wells. Jacks which are mounted over wells grip caissons until barge is in precise position, then lower them firmly to ocean floor.**



**2. DELONG JACKS operate simultaneously through centralized compressed-air control system to raise barge to proper elevation.**

jacks. In the case of this mining installation, the barge will be lifted about 30 ft. above present water level.

### Control Jacks Closely

The air jacks operate simultaneously by compressed air through a master control system which assures level raising of the barge. This master control is so sensitive that the barge can be jacked up or down only 1/16 in. if necessary to maintain proper alignment. Control piping is so designed that it is virtually impossible for operating personnel to drop the barge by mistake, nor will the barge drop if the air compressors or piping fail. Jacks may also be controlled individually if required.

After the barge has been raised to the desired dock elevation, the jacks holding the caissons will be released one at a time, and the caissons will be driven to refusal by a crane-mounted air hammer. Then after everything has been properly lined up, the jacks will be removed

## Picture sequence tells how this dock was built.

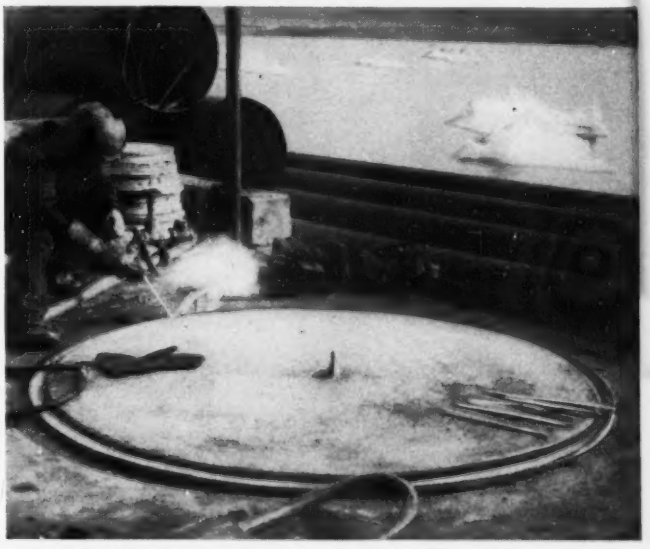
**3.** **JACKS ARE RELEASED, one at a time, to permit air hammer to drive caissons home. Barge is then welded to caissons and caissons are braced. Next jacks are removed, and caissons are cut off at barge height.**

one at a time, and the barge welded to the caissons. Excess lengths of caisson will be burnt off to deck level. Next the caissons will be filled with sand, and a steel cover plate will be welded over the top. Then the dock will be ready to function—to service, moor and load ships of any size.

It is estimated that field work for this type of dock construction requires only one-tenth the time and labor that are generally required in the construction of conventional docks.

### Two More Units

Two additional units like that described above are now being fabricated at the Orange, Tex. construction yards. These will also be towed to the dock site to form a dock 1130 ft. long by 82 ft. wide. Units like these will be fastened together with expansion pins capable of withstanding stresses produced by heat or shocks transmitted to the docks while loading and docking operations are going on.



**4.** **IN FINAL STEP, caissons are filled with sand, covered over with steel plate, and here we see welder putting on finishing touches.**

# How Industrial Hygiene

IMPROVED MORALE, plus safer mining, greatly reduced absenteeism and labor turnover in St. Joe's Missouri mines. See text for details.

ANDREW FLETCHER,
President, St. Joseph Lead Co.,
New York, N. Y.

ALTHOUGH I HAVE BEEN in the atmosphere of hard rock mining for over 20 years, it is a great pleasure to be with you tonight, as my first love was ships. After finishing mechanical engineering at Yale, I worked for about 14 years in shipyards; first as a mechanic, then as foreman, and from 1925 to 1929 I was in charge of what is now known as the Hoboken Yard of Bethlehem Steel. We therefore tonight can talk the same language, which may be of definite benefit in considering industrial hygiene as it affects Navy operations.

I define industrial hygiene as the improvement of working and living conditions, including safety, for the worker and his family. Having the background of a cost-conscious ship repairer, it has not been difficult for me to minimize the altruistic angle of industrial hygiene and consider the dollar savings that result from improved workings and living conditions. This is a viewpoint which the Navy can understand just as easily as do employees in industry.

## Health Aids Productivity

Some people believe that the Navy is the nation's first line of defense, but I believe that our country's first line of defense is the health of its citizens, especially that of the workers in industry. What good is a machine which is 90% efficient in the hands of a man who is only 50% efficient, because of physical

An address given by Mr. Fletcher at the U.S. Navy's Fourth Annual Industrial Health Conference, Cincinnati, Ohio, April 21, 1952.

# Can Lower Industry's Costs

**"I do not know of any company that has improved working and living conditions of its employees that has not obtained satisfactory returns in dollars as well as in human happiness."**

ailments? The past 100 years have been the most important in the history of the United States, and our great progress has been primarily due to development under a free competitive enterprise system of our natural resources and our productive capacity.

By natural resources I do not mean underground wealth, but rather the integrity, energy, freedom, and health of the people. Continued productive progress in the future will be advanced more through the development of our human resources than by plant and equipment development. All men may be created equal, but all men certainly do not remain equal, either mentally or physically. Good health is the most important asset in life. I do not know of any company that has improved working and living conditions of its employees that has not obtained satisfactory returns in dollars as well as in human happiness.

It is much more foolhardy to neglect the health and safety of workers than to neglect the maintenance of a machine. The answer to the question, what good is a 90% efficient machine with a 50%-ill worker, is of course, 45%. What we need to control inflation, in addition to proper credit control and taxation, is more production, and this will necessitate the elimination of a 45% output from a 90% efficient machine.

In the mining operations of the St. Joseph Lead Co., we have over the past few years increased the output per underground man by approximately 50%. I can attribute 45% of the improvement to better equipment and 55% to improved morale. I know of no better way for improving labor-management relations, which is the underlying productive base, than by developing ways of improving working and living conditions.

As I once said at an Industrial Hygiene Foundation meeting, industrial harmony and mutual respect must be earned. They cannot be bought or induced through propaganda any more than an individual can buy respect or a good reputation. The maintenance of good working and living conditions speaks louder than all the pamphlets or posters ever published.

## St. Joe's Experience

But enough of generalities. On the supposition that if it is beneficial for industry, it should be equally good for the industries in which the Navy is now employing about 450,000 civilian workers, I will briefly outline the experience of the St. Joseph Lead Co., which is one of the oldest and largest mining and smelting companies in the United States. I believe you will be convinced that we have not been unduly influenced by legal or paternalistic viewpoints to which the U.S. workman justifiably objects. We have been well repaid in dollars for our actions. Conditions are, of course, different in practically every plant, locality and industry, above all, in ship repairing, where practically every job is different and the work is completed under varied conditions. Although I have often said that any business after ship repairing looks simple, I feel that if I can convince the Navy by citing a few fundamental facts in dollar savings, as I have tried to do in making a number of talks to industry, then the short time we have spent together tonight will save the American taxpayers a little money in building and repairing ships and producing component parts on a cheaper basis.

Thirty years ago before there were many laws covering industrial hygiene, the St. Joseph Lead Co., realized that in order to prevent its best men from entering more attractive fields, it was necessary to improve living and working conditions, so that men could work safely and satisfactorily, raise their families by sending the children to good schools, and by maintaining family health. The improvements were not obtained in the first year, nor in the last. They have been gradual, and, in my opinion, there is still room for improvement before we can sit back in our chairs.

As I have indicated, the development of St. Joe's industrial hygiene program has been one of gradual adoption of new and better control measures through education of management and labor. At the outset of any program, suspicion arises from either or both of these groups, and only through a planned selling program is acceptance possible.

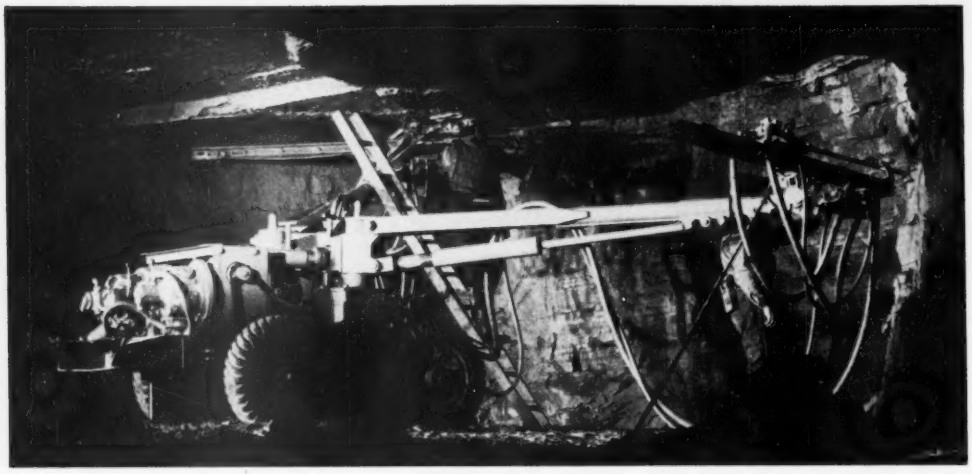
The industrial hygiene program in its infancy was nothing more than dust sampling. Then as problems arose and control measures had to be met, the program developed rapidly into the engineering phase. Once it was shown that good engineering had its merits, the program grew and today we find ourselves in the enviable position of being requested to determine the favorable or unfavorable conditions of the environment.

With this advance, of course, came the increase in personnel. Within the last two years, problems arising in ventilation have been solved which have not only improved working conditions but have actually afforded direct operating savings.

At the outset of using diesel equipment underground, the workers were skeptical of the safety involved. They had read of carbon monoxide poisonings and supposed that they could be subjected to the same experience. Personnel of the industrial hygiene department is always underground with the first day's operation of any new diesel equipment. Extensive tests are made and the results shown to the workers on the spot. The workers are informed of the different gases and their physiological effects.

The same has been true in our extensive water checking of today. Any contaminated source is labeled such for protection to the workers. The employees have come to respect the work in these two fields because education has gone along with the proper engineering to develop the workers to a higher level of understanding.

It is our primary feeling that most every man is proud of what he knows. He likes to relate to others why a water source is bad, why we are checking the air, or why



FULL INFORMATION on safe practices, for example on why drill holes should be collared wet in siliceous areas, is given men like operator of latest-type jumbo shown above. Knowing why, men are more likely to observe safety rules.

**TABLE I—Absenteeism in St. Joe's Southeast Missouri Lead Mining and Smelting Operations (5-day week)**

| Reasons for Absence | Shifts Lost | % Absenteeism Based on 741,853 Expected Shifts of Work | % of Total Shifts Lost |
|---|---|---|---|
| Accidents while at work | 3,619 | .49 | 15.15 |
| Accidents away from the plant | 600 | .08 | 2.51 |
| Sickness | 13,577 | 1.83 | 56.86 |
| Personal reasons | 6,084 | .82 | 25.48 |
| | 23,880 | 3.22 | 100.00 |

drill holes should be collared wet in siliceous areas. The time for hiding results is past; today all our results of gas, water, ventilation, and dust are posted on the bulletin boards at the respective change rooms.

## Turnover Reduced

In 1918, our labor turnover was 250% per year—in other words, it was necessary to employ 250 men each year to keep 100 on the job. If we hadn't improved, to keep our present force of around 5,000 men, it would be theoretically necessary to hire 12,500 new men per year.

Assuming that it takes 20 days to break in a new man (and I do not know of any job in our operations that would not require at least 20 days), and assuming that the value received from a new employee would be about 20% at the beginning of the 20-day period and 80% at the end, his average productive capacity would be 50%.

Assuming an average pay of only $12, the direct cost of replacing one man would be $120 (50% x 20 days x $12). Therefore, to maintain a working force of 5,000 employees, the labor turnover alone would have a direct cost of $1.5-million ($120 x 12,500 men).

I might add that this would be the minimum figure, as it would not include the indirect cost, such as additional supervision, increased accident hazard, decreased efficiency among experienced employees, because of the necessity of giving attention to new employees. If any such condition existed today, St. Joe would be out of the mining business, and I would not be talking to you tonight.

By 1926, St. Joe's labor turnover in its Southeast Missouri mining and smelting divisions had been reduced from the 1918 percentage of 250 to 40%, by 1949 to 12%, and last year it was about 8%. In the future I hope for even better figures when the Herculaneum lead smelter construction program is finished and the number of employees for summer operations will be the same as for winter work. The 1951 figure of 8% is made up of 5% for mining and milling and 34% for smelting at Herculaneum, where about 300 are employed of the total 3,500 for Southwest Missouri.

The actual dollar-and-cent savings indicated by the foregoing 30 years' experience, was in part due to the following:

**By asking employees why they were quitting, we learned of numerous reasons, such as, unhealthy and dangerous conditions, wages too low, unfair treatment by foremen, poor schools, no facilities for recreation, no churches of their faith, etc.**

Before taking definite steps to rectify these apparent justifiable complaints, we made a study of wages, hours, training, safety, health, and living, plus economic security. As a result, we have spent considerable money over the last 30 years; it was not all for physical assets, but rather for the physical well-being of the employees. For example, a physical pre-employment examination was instituted in order to avoid placing men on jobs for which they were physically unfit. Just as important, current examinations are now being made, and if one shows that an employee should not carry on his present job, he is shifted to a new job, and is paid the going rate of the new job,

**NEW CONTROLS on exposure to lead fume are gradually eliminating danger of lead intoxication. See discussion of new approach at right.**

even if it is lower than his former base.

If no job is available, or if he cannot work in safety to himself and his fellow employees, he is pensioned. I do not know of any case where an employee has been discharged because of his physical condition after once being employed.

St. Joe was one of the first companies to have pension and group life insurance plans, and I might add that it is one of the few whose plans have been currently brought up to date by reason of increases in the cost of living, and are completely funded or carried by a recognized insurance company.

Just as an individual takes pride in having a well-kept home or automobile, an employee will enjoy his work more and produce cheaper if he takes pride in the company and the plant in which he is working. Good housekeeping is an extremely valuable asset, and I, for one, continually emphasize this phase of St. Joe's operations. A good environment is, in my opinion, just as important, if not more so, than a few cents an hour additional in wages.

At one time it was the consensus that painting our change rooms and bringing them up to a higher standard was useless inasmuch as the workers would not keep them that way. If one were to take a trip today through some of our newer change rooms, he would readily see the fallacy in this statement. Habits of the workers have been changed; they have improved their personal hygiene and I believe this improvement will carry over into the home. Many times industry finds it too easy to throw up its hands and quit. Workers are as human as anyone else and their living codes can be improved by proper guidance.

St. Joe's advancements in sanitation within the plants serve as a guide and a morale builder to each and every employee. Since the advent of our extensive water sampling program, good housekeeping underground and on the surface, and the general improvement of our change rooms, we have had numerous requests to assist employees in bringing up the sanitary standards of their homes. Unfit drinking water supplies have been improved to the necessary standard and septic tanks have been designed for home usage.

If the Navy's labor turnover is excessive, then there is no reason why the Navy cannot obtain the same dollar benefits by improving working and living conditions, as has St. Joe.

## Safety Pays

I assume that in the Navy, safety is considered as one of the component parts of industrial hygiene. Here is also an opportunity for considerable savings. Once more returning to St. Joe's dollar saving results, the following comparative figures are of interest:

In the period from 1920 through 1926, the average cost of accidents for our lead mining and smelting operations was approximately $2.47 per $100 of payroll and salary roll, and the safety department expense was about 17¢. Even though compensation rates have increased from $20 per week to $30, and even though most people believe that mining is very hazardous, our cost last year was 68¢, and our safety department expense 55¢.

Also, disregarding the fact that the indirect cost of an accident is probably double the direct cost, and adding the safety department expense to the accident cost, St. Joe is saving $1.41 per $100 ($2.64-$1.23). With a Southeast Missouri payroll of around $13-million, the minimum saving is $183,000 ($1.41 per $100 x $13-miliion) for this one division.

At our Josephtown zinc smelting operations, in 1951 the accident cost was only 32¢ per $100, which is the most satisfactory showing that we have had in 20 years; it is doubtful if any other zinc smelter equalled it.

## Testing For Lead

In connection with occupational hazards, for a period of 2½ years, we have been making tests for lead in urine and lead in air at our Herculaneum smelter. Since urines are spot checks, it is somewhat difficult to identify or correlate the worker directly with the environment. What is meant by this is that one could not, with any great degree of accuracy, predict an employee's working place by his urine lead. However, with a certain group of employees, one can readily identify the department of work.

So interesting have been our finding in urine leads that possibly some day urine leads will completely supplant air leads as an index to the working environment. We are very enthusiastic about our program at Herculaneum. Many changes are under way which will afford improved working conditions. At present our only cases of light lead intoxication are coming from those areas which are in the process of change and where controls are yet to be installed. Our figures show no recent record of a hospitalized lead intoxication case.

Some thought has been given to extending our safety and industrial hygiene programs into the local schools. Since our future labor will be drawn from the children of today, it is only fit that safety training begin at an early age. The direct immediate benefit will be that of arousing interest in the child, who in turn will interest the mother and, subsequently, the father.

If safety and the prevention of occupational hazards are good in-

vestments for industry, there is no reason to believe that they are not equally good investments for the Navy.

## Cutting Absenteeism

It is but a short step from labor turnover and safety to absenteeism. Again, let us think in terms of dollars and from the viewpoint of the money that an employee loses in lower earnings and the company in lower production.

Just as in the old days when the belief prevailed that accidents were bound to happen, so today the general feeling seems to be that sickness must be accepted. Our company, however, believes that sick absenteeism can be lessened as well as accidents away from the plant. Also, that the saving in dollars may be just as great as that obtained through lessening labor turnover and improved safety.

If in a period of a year it is found in a plant that the total time lost by each employee is, say, 5% of the total shifts worked, and the production of the plant remains the same, even if 5% of the shifts are not worked, then it follows that there must be 5% extra men carried on the payroll to take the place of the men who are absent.

With a force of, say, 5,000 men, and using a 5% absenteeism figure, it can then be assumed that there are 250 extra men employed (5% x 5,000). It can be conservatively estimated that a man under present conditions is earning $3,000 per year; therefore, the extra men are costing $750,000 per year (250 x $3,000).

But this is only the direct loss. The indirect expense in the case of sickness is probably even greater than in the case of accidents, as a man does not do a full day's work just before he is forced to lay off because of illness, or after he has returned. Also, many men who are sick with heart disease, tuberculosis, and similar chronic diseases, may work when they should be at home.

It is of course appreciated that no matter what precautions are taken, there will be some sickness and miscellaneous absenteeism, but if the direct cost of absenteeism in a 5,000-man organization can be reduced, the saving will approximate $150,000 ($750,000 ÷ 5) for each 1% reduction.

I offer the following suggestion for lessening absenteeism: First, obtain competent information, and for comparative purposes the form used by the Public Health Service is satisfactory. But reporting, however, should be on the absences of one day, and not on the basis of eight days. In collecting the data, employees should be told why the study is being made, and that the information will not affect their personal liberties. Also, that when data definitely show certain conditions in a particular department to be unfavorable, a serious effort will be made to develop remedies. It should of course be realized that in any plant that is working more than 40 hours per week, absenteeism will be greater, especially the time taken off because of personal reasons. For many comparative purposes, I am summarizing St. Joe's 1951 absenteeism figures for its Southeast Missouri operations in Table I.

As the sick absenteeism figures are based on employees' statements without any careful checking, it should be realized that the illness figure of 1.83% is probably somewhat magnified by the inclusion of time taken for fishing, hunting, and ball games, but even if this figure were 2% of 250 workable days, it only amounts to five days of sickness per year, which is very much less than the 15 days allowed by Navy and Civil Service regulations.

## Safety At Home

St. Joe is definitely opposed to paying for time not worked, and is in favor of paying wages which will permit the employee to decide whether he wishes to take Blue Cross insurance or other coverages.

It is advisable for companies or a recognized local physician, to talk to the men collectively at certain periods. These talks should be stenographically reported and mimeographed copies mailed to the men's homes, so that there can be some family discussion. If a man has already heard the doctor's story, he will be disposed to discuss a pamphlet, and in so doing will help himself as well as his family with a doctor's suggestion.

Last year at Josephtown we were concerned with the amount of accidents away from the plant, and families were asked to attend a safety meeting held in the auditorium. The children were given first-aid kits, and the reaction of all concerned was most favorable.

I do not know whether the Navy takes any active interest in a civilian employee's family; if not, it should, because a man's home life has a very great bearing on his mental and physical condition. A wife is certainly an "indirect" member of any organization, as it is her responsibility to provide satisfactory food and home life for the family. A well and happy employee does, without thinking, a better job than one whose mind is away from his work because of family worries. It is very probable that diet has a great bearing on health, but information of this kind cannot be obtained from employees without a study of their home life and activities outside of working hours.

## Building Better Lives

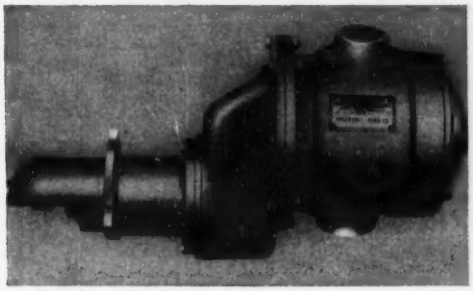
The time may come when employees will not hesitate to give information as to personal habits, but this is a subject which I hestitate to suggest, even though very constructive results might be obtained. There, however, can be no objection to placing in change houses pamphlets on diet, health, etc., by recognized authorities, such as the U. S. Public Health Service and the large life insurance companies.

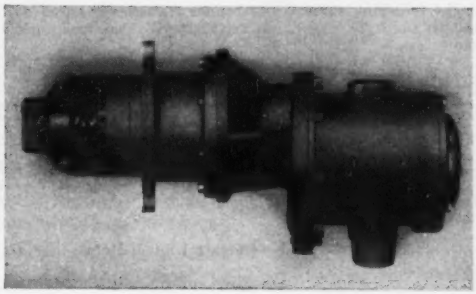
So-called rehabilitation departments are profitable, as men can more quickly be put to work, even if not in their regular jobs. The St. Joseph Lead Co. has found that the dollar value of the output of its rehabilitation departments is definitely greater than the wages paid to injured employees or those recovering from sickness. Men would much rather work than receive compensation.

A close personal relationship between management and employees will reduce absenteeism, especially if each employee can be made to feel that his job is important. For example, when an employee returns to work after an absence, it would be helpful if his immediate superior would comment, "Missed you yesterday." Obviously supervisory personnel should have an excellent absenteeism record—leadership in all industrial hygiene matters is just as important as leadership in production problems.

Although it must be quite apparent from my comments tonight that dollars can be saved through reducing labor turnover, improving safety and lessening absenteeism, I hope no one will get the impression that I have forgotten the altruistic aspect of industrial hygiene and the human satisfaction that comes from improving the industrial environment of the worker. Naturally, this is just as important. The main point, however, is just as industry has benefited from industrial hygiene—so can the Navy.

# KEEPING TAB ON PRACTICE





**AIR STARTING MOTORS, as made by one large manufacturer of compressed air tools and other equipment, come in these two sizes. That on the left develops 7 hp. at 75-lb. air, and 16 hp. at 150-lb. air. The unit on the right develops 19 hp. at 75-lb. air, and 41 hp. at 150-lb. air. Both operate through the wide range of pressures.**

## More Operators Air-Start Their Big Diesels

COMPRESSED-AIR starting, or cranking, motors are competing with batteries for starting gasoline and diesel engines. This application is growing in open-pit mining where diesel engines are used to drive heavy-duty trucks and other equipment. The air motors are smaller and more compact than equivalent electric starters and are said to insure reliable starting. They also eliminate need for generators, banks of storage batteries, and expense of maintaining and replacing batteries. Climatic conditions leave them unaffected.

Development of this practice has taken over 20 years. As long ago as 1930, Ingersoll-Rand began furnishing a few compressed-air units each year for cranking diesel and gasoline engines. One West Coast manufacturer regularly furnished such engines with air-starting motors as standard equipment. More recently the practice of using air starting has spread to the oil-well drilling field and to the marine field.

### New Heavy-Duty Trucks

Attention of some operators of mining and heavy construction equipment was directed to the advantages of air-motor starting early in 1950 by Ingersoll-Rand. Much of this heavy equipment, such as the large trucks used in open pit metal mines, was commonly equipped with 7½ to 12-cfm compressors, normally used for power braking, power steering and power dumping. Because of the size of diesel engines employed, 12 v. and 24 v. battery systems were used. These are of a special sort and do not duplicate the standard 6 v. system used on most equipment of this type, and the price of generators, starters, and bulbs is high by comparison. It proved good economics to use the compressor on the truck for starting and to provide a 6 v. system of generator and batteries for lights in place of the more expensive 12 v. and 24 v. system. In addition to the actual saving in equipment, the number of batteries and their weight were reduced by as much as 75% in some cases.

One large operator on the Minnesota iron ranges had on order or in service in 1951 about 100 large trucks equipped with air motor starting.

The heavy equipment is usually operated in areas near an adequate supply of air so that the air system may be recharged at the start of the shift, or a mobile compressor is available for recharging in case the air should be lost if the equipment is parked a long time. In most cases, additional receivers have been installed on the truck, so that more than enough air is available for starting when stall-outs occur when the unit is out on the road.

In one mining area, the gasoline engine normally used to start the diesel engine powering an underground loader was allowed to run so that the operator was overcome by the exhaust fumes. As a result, the company replaced its gasoline starting engines with air motor starters. To prevent future similar accidents, it is likely that air starting motors will be increasingly used underground.

One large fleet operator, operating over-the-road trucks, estimates a saving of $9 per trip between High Point N. C., and Bayway, N. J., due to the increased payload that is possible with the air system.

The air starting unit is a simple mechanical device which can be cleaned, repaired and easily maintained by the average mechanic. It consists of a multi-vane air motor which cranks the engine through a Bendix drive designed to match the performance characteristics of the air motor. The latter consists of a solid, hardened steel rotor, revolving in a cylinder of hardened wear-resistant alloy, and enclosed by bronze end-plates. The motor has five vanes to insure a smooth flow of power. Ample-sized ball or roller bearings are used throughout to support all rotating parts, and to give long life, trouble-free service.

### High Cold-Weather Power

Provided adequate air is available, an advantage of the air motor system is that the cranking motor continues to develop maximum power even when operating at low temperatures. Operators who frequently have starting problems due to cold weather might well investigate the advantages of air motor starting. Complete air starting motors are available for most of the larger sizes of diesel and gasoline engines.

The manufacturer mentioned offers two sizes of units. The smaller develops 7 hp. at 75 lb. air, and 16 hp. at 150 lb. The other develops 19 hp. at 75 lb. air and 41 hp. at 150 lb. Most recommendations for specific size engines are based on pressures of 100 lb. air or less but the units may be used on pressures up to 150 lb. The result of using the starter at a higher pressure than the minimum recommended only increases the cranking speed and makes the engine easier to start.

# MARKETS—Trends and Prices *(Continued from page 69)*

## Summary of Copper Statistics

The following summary of copper statistics is based on figures compiled by Copper Institute. It accounts for the bulk of the free world's supply. Figures in short tons.

| | United States | | Jan.-April | |
|---|---|---|---|---|
| Production: | March | April | 1951 | 1952 |
| Crude, primary | 83,389 | 84,566 | 328,936 | 325,352 |
| Crude, secondary | 3,721 | 4,857 | 21,921 | 15,249 |
| Totals | 87,110 | 89,423 | 350,857 | 340,601 |
| Refined | 94,563 | 98,402 | 427,625 | 389,213 |
| Deliveries, refined | (a)112,625 | (a)107,355 | 439,150 | (a)455,205 |
| Stocks at end, refined | (b) 58,487 | (b) 61,223 | 52,800 | (b) 61,223 |

| | Outside United States | | Jan.-April | |
|---|---|---|---|---|
| Production: | March | April | 1951 | 1952 |
| Crude, primary | 118,489 | 115,567 | 459,026 | 453,971 |
| Crude, secondary | 496 | 281 | 1,107 | 2,331 |
| Totals | 118,985 | 115,848 | 460,133 | 456,302 |
| Refined | 98,767 | 107,237 | 393,532 | 400,183 |
| Deliveries, refined | 77,427 | 92,391 | 310,943 | 339,352 |
| Stocks at end, refined | 163,220 | 166,043 | 164,588 | 166,043 |

(a) Includes tonnages delivered from government stocks. (b) Includes tonnages delivered to U.S. consumers at foreign ports.

## Official London Prices

Consumers in the United Kingdom obtain copper, lead and zinc at prices named by the British Ministry of Metals. Delivered prices in effect as May ended were as follows:

| | Per Long Ton £ | s. | d. |
|---|---|---|---|
| **COPPER:** | | | |
| Electrolytic, high conductivity | 231 | 0 | 0 |
| Fire refined, high conductivity | 231 | 0 | 0 |
| Fire refined, high grade | 230 | 10 | 0 |
| Fire refined, min. 99.7 percent | 230 | 0 | 0 |
| Fire refined, min. 99.2 percent | 229 | 10 | 0 |
| **LEAD:** | | | |
| Soft, foreign duty paid | 129 | 0 | 0 |
| Soft, Empire | 129 | 0 | 0 |
| English, refined | 130 | 10 | 0 |
| **ZINC:** | | | |
| Foreign (G.o.b.) duty paid | 166 | 0 | 0 |
| Domestic (G.o.b.) duty paid | 166 | 0 | 0 |
| Prime Western and debased | 166 | 0 | 0 |
| Refined and electrolytic | 170 | 0 | 0 |
| Minimum 99.99 percent | 172 | 0 | 0 |

## Miscellaneous Metals, Ores, Minerals

Quotations cover wholesale lots, prompt shipment, f.o.b. New York unless otherwise stated

### MISCELLANEOUS METALS

May 31, 1952

| | |
|---|---|
| Aluminum, ingot, 99 plus percent, lb. (base price) | 19c. |
| Antimony, spot, lb., 5 tons and up but less than carload, in cases | 42.47c. |
| Bismuth, ton lots, lb. | $2.25 |
| Cadmium, commercial sticks, delivered, lb. | $2.25 |
| Calcium, lb., ton lots, 98 percent, cast | $2.05 |
| Chromium, 97 percent grade, lb., contract | $1.07 |
| Cobalt, 97 to 99 percent, per lb. | $2.40 |
| Indium, troy oz. | $2.25 |
| Nickel, cathodes, lb., f.o.b. Port Colborne (a) | 56½c. |
| Magnesium, 99.8 percent, carloads, lb., producer's plant, Freeport, Texas | 24½c. |
| Palladium, troy oz. | $24.00 |
| Platinum (Official quotation wholesale lots) troy oz. | $90.00 |
| Quicksilver, flask of 76 lbs., 25 flasks or more | $197 @ $200 |
| Selenium, 99.5 percent, lb. | $3.00 @ $3.50 |
| Silicon, minimum 97 percent, carloads, lb. | 20c. |
| Tellurium, lb. | $1.75 |
| Thallium, 100 lb. or more, lb. | $12.50 |
| Titanium, 99.3 percent, lb. | $5.00 |

(a) Includes U. S. duty.

### METALLIC ORES

| | |
|---|---|
| Beryllium Ore, imported, 10% BeO, per unit | $36.50 |
| Chrome Ore, per long ton, f.o.b. cars Atl. ports, dry | |
| 44% $Cr_2O_3$ no ratio | $27.00 @ $28.00 |
| 48% $Cr_2O_3$, 3 to 1 ratio | $44.00 @ $55.00 |
| Iron Ore, Lake Superior, Lower Lake ports, long ton: | |
| Old Range bessemer | $8.70 |
| Mesabi bessemer | $8.45 |
| Mesabi, non-bessemer | $8.30 |
| Lead (Galena), 80 percent, Joplin, Mo., ton | $188.55 |
| Manganese Ore—Per long ton unit of Mn-basis 48 percent manganese, nearby positions, subject to premiums and penalties, $1.22 @ $1.26, c.i.f. U. S. ports, duty extra. Long-term contract nominal at 90c. to 95c., c.i.f., duty extra. | |
| Molybdenum Ore, 90%, per lb. of $MoS_2$ f.o.b. mines | 60c. |
| Tantalite, 60% concentrate, per lb. | $2.00 @ $2.25 |
| Tungsten Ore, per unit of $WO_3$ | |
| Foreign, 60 percent, U. S. equivalent, duty extra | $57.50 @ $59.50 |
| Domestic, scheelite, 60 percent f.o.b. mill | $65.00 |
| Vanadium Ore, per lb. of contained $V_2O_5$ f.o.b. mines | 31c. |
| Zinc Ore, Prime, 60 percent concentrate, Joplin, Mo., per ton | $135.00 |

(a) F.o.b. port of shipment.

### METALLIC COMPOUNDS

| | |
|---|---|
| Arsenous Oxide (arsenic trioxide) lb., in bbl. carload lots delivered | 6½c. |
| Cobalt Oxide, 72½ to 73½%, ceramic grade, per lb. | $1.82 @ $1.84½ |
| Copper Sulphate, 100 lb. | $8.95 @ $9.95 |

### ALLOYS

| | |
|---|---|
| Beryllium Copper, 4 percent Be, per lb. of alloy, 5 lb. ingot | $1.56 |
| Ferrochrome, 65 to 69 percent, per lb. of Cr contained | 21¾c. |
| Ferromanganese, 78 to 82 percent, gross ton, seaboard | $185.00 |
| Ferromolybdenum, 55 to 65 percent Mo. lb. of Mo. contained | $1.32 |
| Ferrosilicon, 50 percent, per lb. of contained Si | 12.4c. |
| Ferrotungsten, 75 to 80 percent, lb. of W contained | $5.00 |
| Ferrovanadium, per lb. of V delivered | $3.00 @ $3.25 |
| Silicomanganese, Max. 1½ percent carbon, per lb. contracts | 9.9c. |
| Spiegeleisen, per long ton, 19 @ 21 percent grade | $75.00 |

### NON-METALLIC MINERALS

| | |
|---|---|
| Asbestos, f.o.b. Canada (Quebec) mines (U. S. funds) ton: | |
| Crude No. 1 | $960 @ $1,500 |
| Crude No. 2 | $595 @ $900 |
| Spinning fibers | $275 @ $475 |
| Shingle fibers | $123 @ $170 |
| Paper stock | $85 @ $119 |
| Waste | $63 @ $70 |
| Shorts | $30 @ $63 |
| Asbestos, Vermont, f.o.b. Hyde Park: | |
| Spinning fibers | $279.50 @ $302.00 |
| Shingle stock | $135.00 @ $162.00 |
| Paper stock | $81.50 @ $115.00 |
| Waste, stucco or plaster | $71.40 |
| Refuse or shorts | $34.00 @ $63.00 |
| Barytes, f.o.b. mines: | |
| Georgia, crude, per long ton | $13.00 @ $13.50 |
| Missouri, 93 to 94 percent $BaSO_4$, per short ton | $10.15 @ $10.40 |
| Bauxite, long ton, f.o.b. point of shipment: | |
| Domestic, crude, 50 to 52 percent (not dried) | (a) $4.50 @ $5.50 |
| Domestic, chemical, 55 to 58 percent | (a) $8.50 @ $9.50 |
| Domestic, abrasive, 80 to 84 percent | (a) $18.00 @ $18.50 |
| China Clay, f.o.b. mines, ton: | |
| Georgia, filler and ceramic grades | $8.50 @ $9.50 |
| North Carolina ceramic grade | $20.25 @ $22.25 |
| Feldspar, bulk ton: | |
| Potash or soda feldspar, 200 mesh, ceramic grade | $18.50 @ $22.25 |
| Glass feldspar, white, 20 mesh | $11.75 @ $12.50 |
| Fluorspar, f.o.b. mines, bulk, 70% effective ton | $43.00 |
| 60% effective $CaF_2$ | $40.00 |
| Acid 97% concentrate, bulk, ton | $60.00 @ $65.00 |
| Fuller's earth, f.o.b. Georgia or Florida, ton | $7.00 @ $14.00 |
| Magnesite, per ton dead-burned, bulk, f.o.b. Washington | $36.30 |
| Mica—Domestic, f.o.b. mines. Punch 12 to 22c. per lb. according to size and quality. Sheet, clear, 1½ x 2 inch, 80 to 85c.; 2 x 2 inch, $1.10 to $1.20; 2 x 3 inch, $1.50 @ $1.60; 3 x 3 inch, $1.80 @ $1.90; 3 x 4 inch, $2.20; 3 x 5 inch, $2.40; 4 x 6 inch, $3.15; 6 x 8 inch, $4.25. Wet ground, very fine, $140 @ $155 per ton. Bulk sales, dry ground: $32.50 @ $70.00 per ton. Scrap, $32 and up. | |
| Ocher, Georgia, ton, in sacks | $26.25 |
| Pyrites, Spanish, per long ton unit of S, c.i.f. Atlantic ports | Not quoted |
| Sulphur, Texas, mines, long ton | $22.00 |
| Talc, f.o.b. works, ton: | |
| New York, purified | $18.50 @ $20.00 |
| Vermont, extra white | $12.50 |
| Tripoli, Missouri, ton: | |
| 40 mesh, cream colored | $30.00 |

(a) Nominal.

### IRON AND STEEL

| | |
|---|---|
| Pig iron, gross ton, basic, Valley furnaces | $52.00 |
| Steel, f.o.b., Pittsburgh billets, net ton | $56.00 |
| Structural shapes, 100 lb. | $3.65 |

# All these Valves . . from One!

**Valve combinations for 90% of industrial piping assembled with 4 bodies and a handful of parts.**

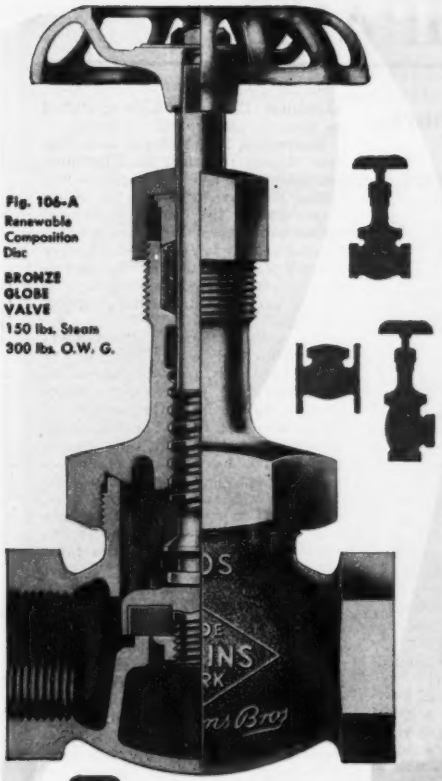
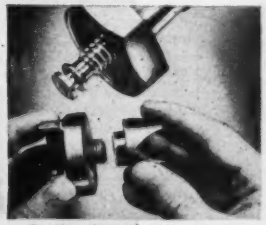


Fig. 106-A
Renewable Composition Disc

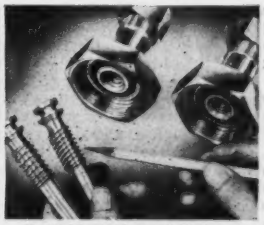
BRONZE GLOBE VALVE
150 lbs. Steam
300 lbs. O.W. G.

**JENKINS FIG. 106-A "FAMILY"**

Start with the standard Fig. 106-A. Trimming is interchangeable in Globe or Angle body, screwed or flanged.

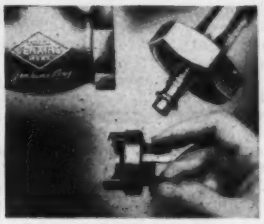


**For Close Control** — In throttling service, the nut which holds the disc in the disc holder is removed and replaced with Throttling Nut, Fig. 344.



**For Quick Opening and Closing** — Merely substitute the bonnet and spindle from Fig. 941, in which threads are pitched more sharply.

**For Lift Check Service** — Globe or Angle Bodies can be fitted with interchangeable Cap, Disc Holder, and Guide Disc Nut from Fig. 117A. Addition of spring from Fig. 655A provides spring loaded service.



**For Stop & Check Service** — Use the 106A trim, but substitute this spindle from Fig. 630A and replace the regular disc nut with the check valve guide disc nut.

Look over these pictures and see how easy it is to make up just the valve type you need, simply by interchanging parts. Think of the saving this means in maintenance expense . . . in reduced inventory of spare valves in your stockroom.

That's a big reason why the Fig. 106-A series takes top honors in any poll for valve preference. And Jenkins time-proved design, makes them the longest-lasting, lowest-upkeep valves that money can buy.

For example, see the heavy construction of the one-piece, screw-over bonnet. You can remove and replace it over and over again without distortion. See the extra size packing box,—and the perfectly machined threads on the heavy manganese bronze spindle, with more threads in contact with the bonnet, open or closed.

Remember, Jenkins Bros. is the originator of the renewable composition disc valve,—the *only* manufacturer of both valves *and* discs. For drop-tight, trouble-free performance, get acquainted with the Fig. 106-A "family". Despite their extra value, *you pay no more* for Jenkins Valves. Jenkins Bros., 100 Park Ave., New York 17, N. Y. Jenkins Bros., Ltd., Montreal. Sold through leading Industrial Distributors.

JENKINS VALVES

# WASHINGTON IMPACT

## Chilean Copper Settlement Restores Imports, But Multiplies Metal Pricing Problems

FOLLOWING WEEKS of intensive and secret negotiation in Washington, New York, and Santiago, Dr. John R. Steelman, acting administrator of the Office of Defense Mobilization, announced May 21 that large copper consumers in the United States could buy Chilean copper at "prevailing world prices." At the same time, the Office of Price Stabilization, forced to yield on the issue, said that at least it would hold the line on the domestic copper price of 24½¢ per lb.

This meant that Chilean copper would move freely again, to the United States and to other consumers, at a price likely to hold for some time in the neighborhood of 33¢ to 35¢ per lb.

This price level was not chosen arbitrarily. Chile had sold 20% of her copper for some weeks last year at the luxurious price of $1,200 per ton, about 54¢ per lb. The rest went to regular customers at 27½¢ per lb. If one figured a weighted average price for these two tonnages, it would come out at almost exactly 33½¢ per lb. When the market in Europe for the 54¢ copper dried up, somebody in Chile calculated this average and decided that if the country were to maintain its income, they'd have to sell all their copper at 33½¢ to balance the loss of the 54¢ market.

The U. S. State Department, anxious to avoid more blunders of the Bolivian variety, pressed to get a price increase to help out the incumbent Videla regime in Chile, which must undergo the test of an election before long. The DPA simply wanted to get Chile's copper, inasmuch as Chile, as a bargaining move, had choked off copper shipment altogether.

One scheme proposed was that Chile get a 33¢ price, and that her copper be brought in and allocated among all domestic consumers, so much 33¢ copper and so much 24¢ copper prorated to all domestic consumers. It took considerable patient explaining of how the copper market works to talk the government out of that one. Actually, this allocation idea was still in Steelman's announcement, and a meeting was promptly called in Washington to iron out the point.

Chile's copper will probably continue to be sold out of Santiago at a price based on a New York equivalent, and in the neighborhood of 33¢ per lb. But pressure began mounting almost instantly from small and medium-sized domestic producers to raise the domestic price. A 3¢ spread was bad enough, but no miner can sit idly and watch foreign copper going to the same markets that take his own metal at a price 9¢ higher. Perhaps the ceiling may have cracked by the time you read this. So far, the only OPS comment was that they don't expect that 33¢ price to hold very long anyway, so why upset price control for a temporary flurry in the market?

### Some Control Retained

There was no effective opposition to the continuation of materials controls in the new Defense Production Act, even though retiring DPA administrator, Manly Fleischmann and his successor, Henry H. Fowler, also NPA chief, both conceded that only about 20% of the Nation's overall output is going into defense. DPA's argument: We're only halfway through the three-year program to build up our armed strength and industrial mobilization base; to assure its completion, the government must have authority to regulate production through materials allocations and priorities.

In the midst of congressional hearings, NPA announced with a great deal of fanfare its decontrol, in varying degree, of lead, zinc, bismuth, cadmium, and antimony. This was to impress Congress and private industry that though the Administration wants to hold on to its allocation and priority authority, the power will be used only as insurance. Specific controls will be relaxed or completely dropped as individual situations improve.

The production mobilizers testified that out of a total stockpile objective of $9.3-billion worth of materials, only $5.7-billion worth were already in the stockpile or on order by January, 1952. Fleischmann explained that deliveries of certain materials to the stockpile have been slowed down because of other "immediate needs." But he said that as supplies increase, they will be channeled to the stockpile.

### Aluminum Use Climbs

Use of aluminum as a substitute for copper is constantly increasing. For example, third-quarter applications to NPA for controlled materials showed that copper represented only about 35% of electric-carrying capacity of all conductors, as compared with over 50% last year. Greatly responsible for the trend are NPA's electrical equipment and motor vehicle divisions, which have been encouraging manufacturers in their field to experiment with aluminum in the production of components normally made of copper. Also involved, of course, is the agency's Aluminum Division, which is staffed by loyal members of the industry.

Meanwhile, NPA's Metals and Minerals Bureau (of which the Aluminum and Copper Divisions are a part) was forced recently to issue this flimsy statement for the benefit of worried copper producers: "While we are trying desperately to stretch out supplies of some materials, we are not suggesting that manufacturers turn to substitute materials in post-emergency planning."

The specific reference to "post-emergency planning" was a balm to the copper producers, and was supposed to emphasize that government encouragement to use aluminum instead of copper was just for the mobilization-induced shortage period; later, manufacturers could presumably go back to copper. However, manufacturers do not make a habit of switching from material to material (and from one type of production equipment to another) as national emergencies come and go.

### Why Ruby Mica?

Domestic mica producers yelled so loud about the Munitions Board's policy on stockpiling only ruby mica that the agency is now thinking about revising mica stockpile specifications. The Board is canvassing 20 leading capacitor manufacturers to determine formally whether top-grade ruby mica is the only type of mica suitable for use in the manufacture of capacitors, tubes, and other electronic devices.

The Board stockpiles only materials that have the widest possible use during a mobilization period; in the case of mica, this has meant "ruby." The Board has assumed that electronics manufacturers prefer ruby to green mica because of its low power-factor. But the cries of domestic mica miners, who now produce only about 300 tons of ruby a year, prompted the Board to reconsider. The agency will not revise the mica stockpile specifications, however, until it gets the okay of the electronics industry and the American Society of Testing Materials.

The situation came to a head in March, when GSA started its domestic mica purchasing program, through which it hopes to boost domestic output about four times over the next three years by paying premium prices. The program calls for the buying of 25,000 tons. GSA concedes that 1 ton of this government-bought mica will yield less than 90 lb. of the quality now suitable for stockpiling. This is another factor that made the Munitions Board reconsider.

Ruby makes up less than one-fifteenth of total domestic mica output. The U. S. is now producing only about 15% of its overall mica requirements.

*(Continued on page 106)*

# What's New in hydroseparators?

Newest addition to the Dorr line of hydroseparators is the Type BW — a modification of the thoroughly proven and accepted Type H introduced several years ago. It is the *economical* answer to the problem of handling granular solids which do not warrant the use of the heavier Type H — but which are too heavy for a standard unit. Here are its major features...

**Power to spare when you need it** . . . through the BW's heavy-duty balanced worm and spur-gear drive.

**Positive overload protection** . . . by means of an automatic hydraulic lifting device activated by the torsional load on the mechanism. When an overload is encountered the rakes raise quickly — then lower slowly as the overload is reduced.

**Unique Center-Shaft Design** . . . combining an outer drive tube to which the pivoted drive rods are hinged and an inner lift tube which carries the rake arms.

**Free, center-cone discharge** — entire rake and drive mechanism is supported by a truss spanning the tank. Result . . . a clear center-cone area . . . providing unimpeded discharge of heavy solids.

The Type BW is available in diameters ranging from 40 to 75 feet. We'd like to tell you how it can fit into your picture economically . . . without obligation of course.

Better tools TODAY to meet tomorrow's demand

DORR

WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT

THE DORR COMPANY • ENGINEERS • STAMFORD, CONN.

Offices, Associated Companies or Representatives in principal cities of the world.

### That Paley Report

The long-heralded report of the President's Materials Policy Commission (known also as the Paley Commission—after William S. Paley, its chairman) will finally be published late this month in five hefty volumes. It will aim to show to what extent shortages of materials now hamper the nation's economy and prevent its future growth, and will recommend what the President and Congress should do about it.

The report was originally due in October, 1951, and in only three volumes. But deadlines were extended and the size increased as the job grew in scope. The Commission's recommendations, which will deal with such questions as stockpiling, allocation controls, prices, and subsidies, have been carefully kept secret to hold back controversy until the report is actually issued.

The Commission thinks its report will become the major reference work in the raw materials field. It will contain the most up-to-date figures in the world's existing natural resources and a detailed, long-range requirements outlook. The Government Printing Office is now preparing the volumes for public sale. The probable price: over $10.

In addition to Paley, who is chairman of the board of Columbia Broadcasting System, the Commission's members were George R. Brown, a Houston, Tex., business executive and engineer; Arthur H. Bunker, president of Climax Molybdenum Co.; Eric Hodgins, noted business editor and author; and Edward S. Mason, dean of Harvard's graduate school of public administration.

## Newsnotes from the capital

**F. Morton Leonard,** 63-year old chief of the Tariff Commission's Metals Division, plans to retire this year after 30 years as a government metal and minerals official. . . . DMEA has certified **five more strategic mineral discoveries** under its exploration aid program: monazite on the holdings of the Ruby Meadows Mining Co., Idaho County, Idaho; sulphur on Continental Sulphur and Phosphate Corp. property in Park County, Wyo.; tungsten on property of American Alloys Metal, Inc. in Beaverhead County, Mont.; ruby mica on holdings of Fred D. Cabe near Franklin, N. C.; and beryl and strategic mica on property of Lewis W. Collingswood near Custer, S. D. . . . **DPA has set up expansion goals** calling for: (1) a 21-million lb. annual cobalt supply in 1955 (an increase of about 11-million lb. above the 1950 supply); (2) new capital investment of $6-million in the mining machinery industry by 1954 to meet the 60% increase in demand for equipment during the past two years. The industry's capital investment as of 1951: $280-million.

# LABOR THIS MONTH

***Joseph M. Gambatese, McGraw-Hill Washington News Bureau***

**STEEL STALLS:** CIO's "drive" to take over from Mine, Mill and Smelter Workers in western mines seems stalled for the time being.

No activity of real consequence lately. Steel Union officers didn't even mention mining in reporting on organizational activities to convention delegates at Philadelphia. Instead, they spoke of progress among white-collar groups in steel plants and of plans to organize seamen on lake ore carriers.

**UMW MOVES AT CARLSBAD:** Mine-Mill's chief raiding problem right now is three potash mines at Carlsbad, N. M. Gains made by organizers for John L. Lewis's United Mine Workers' District 50 have forced Mine-Mill to petition NLRB for a certification election. District 50 hasn't filed non-Communist affidavits, so can't be on the ballot. But it is campaigning for a "no-union" vote. If successful, it will claim the workers prefer District 50, ask for bargaining rights.

**COPPER NEGOTIATIONS:** Mine-Mill is concentrating on Anaconda, first with exploratory talks. Real bargaining won't begin until late summer. Union is asking 25¢ an hour, plus some fringes. It will make concessions to get agreement, avoid government dictation to settle dispute. Union bargainers fear government stabilizers will be stingy in second round under stabilization rules. The Steel Union has made some settlements for 3¼¢ cost-of-living increase in wage reopenings.

**BRAKE ON INDUSTRY BARGAINING:** Mine-Mill demands for industry-wide or corporation-wide bargaining has suffered a setback. It is the result of the steel and Borg-Warner disputes with CIO unions.

**IN STEEL:** Philip Murray is beginning to wonder about industry-wide stoppages which force government action, especially if there should not be "a friend" in the White House. Without solid presidential backing, the CIO president may find strikes against single steel companies preferable. They don't create "emergency" situations and put competitive pressure on the company to settle.

That's how Walter Reuther does so well in the automobile industry.

**AT BORG-WARNER:** The Wage Stabilization Board accepted an opinion of the National Labor Relations Board that WSB has no authority to recommend corporation-wide bargaining. That is a matter for NLRB, under Taft-Hartley. And NLRB has in the past refused CIO Auto Union efforts to make a single contract covering its members in 12 of some 25 Borg-Warner divisions.

**"OPEN THE BOOKS":** NLRB's rule that an employer must produce facts to support any claim of inability to pay a wage increase demanded by a union has been upheld by the U. S. Circuit Court of Appeals. Decision also says company cannot refuse to bargain, during life of contract, on issues not previously discussed and not covered by the contract. Case involves Jacobs Manufacturing Co. and UAW-CIO.

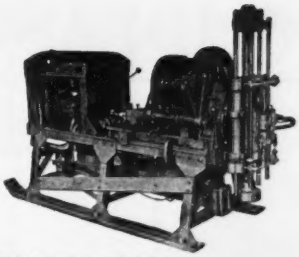
**VACATION CLUE:** Deviation from WSB's steel industry recommendation of three weeks' vacation with pay after 15 years of service is suggested by a WSB panel at American Smelting & Refining Co.'s Garfield smelter. Case involves dispute with Steel Union, too. The panel recommended against Steel Union demand that 63 clerks get three weeks' vacation after 15, instead of 20 years, even though ASARCO has this plan at other facilities. Reason: Panel thinks WSB should not upset balance with 1,100 production workers at same smelter who don't get three weeks until after 20 years.

**PHELPS-DODGE ELECTION:** Employees at the new Lavender pit of Phelps-Dodge at Bisbee, Ariz., will vote in an NLRB election whether they wish to be represented by Mine-Mill or by AFL craft unions, or no union at all.

**BENTON BLASTS MMSW:** Sen. Benton pinned the Communist label on Mine-Mill when it led a delegation from Connecticut's Naugatuck Valley to Washington to complain about unemployment in the brass and copper mills. Benton told the Mine-Mill members—and Congress—that union leaders were exploiting them and their predicament to advance communist aims.

**TRAVIS'S VIEW:** Available copper will provide twice as many jobs if processed into consumer goods instead of war material, Maurice Travis, secretary-treasurer of Mine-Mill told a conference of left-wing union leaders in California. Three years ago Travis told the Mine-Mill convention that he quit the Communist Party only because it was necessary under the Taft-Hartley law, and that he still believed in communism.

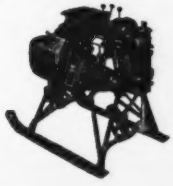
BBS-2: Versatile, choice of 5 swivelheads. Depth to 2400 ft. Gas or diesel.



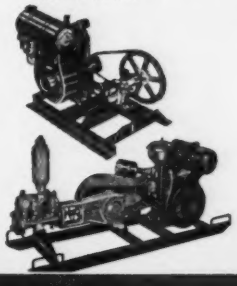
BBS-4: Drills to 5000 ft. with "B" rods. Moves under own power. Gas or diesel.

X-RAY: Compact, portable—185 lbs. net. Drills ¾" core to 200 ft. Low fuel consumption.

BBS-1: World's best known surface drill. Takes "E" rods to 1000 ft., "A" to 800 ft.

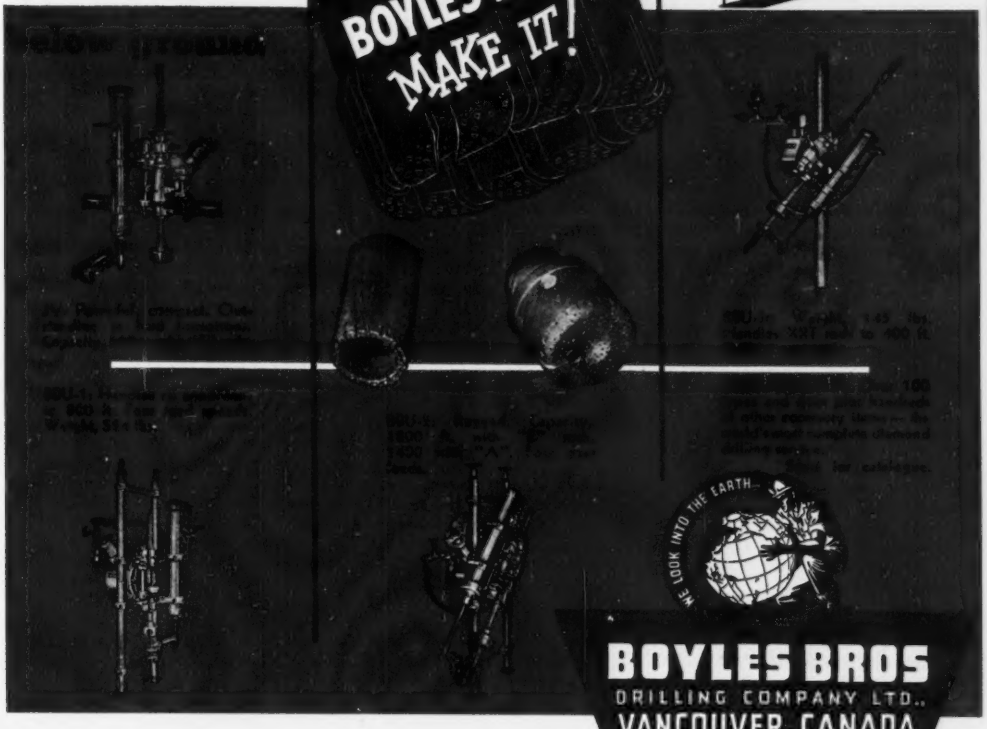


5-12 and 4-7 Drill Pumps with capacities 400 to 1200 g.p.h. Also 360 model—Ideal to 2000 ft. radius.



**above ground**

If it's for diamond drilling BOYLES BROS MAKE IT!



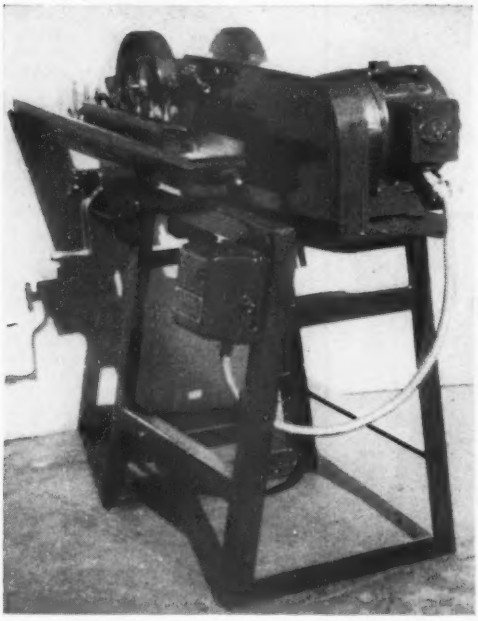
WE LOOK INTO THE EARTH

**BOYLES BROS**

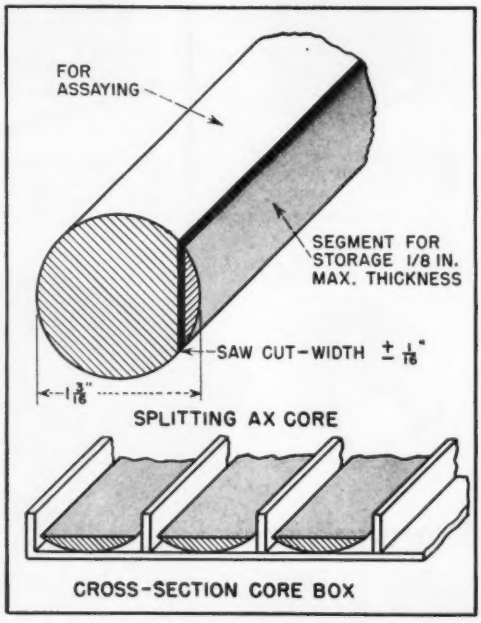
DRILLING COMPANY LTD.,

VANCOUVER, CANADA

# OPERATING IDEAS



CORE SPLITTER shown here does not have plexiglass hood. The St. Clairs have found it unnecessary.




BEST WAY TO SPLIT leaves large portion for assay and small one which stores conveniently in small core box.

## More on How To Split a Diamond-Drill Core

A letter from John Q. St. Clair (mining geologist, 300 Builders Exchange Bldg., Duluth, Minn.) and his brother, William, tells us that the diamond saw for splitting cores (Nov., 1951 *E&MJ*, pg. 110) is the one they introduced in South Africa a few years ago. It is essentially the same except for minor additions. The St. Clair brothers plan to manufacture this unit in the United States. They also cleared up a few points concerning the method and reason for sawing drill cores:

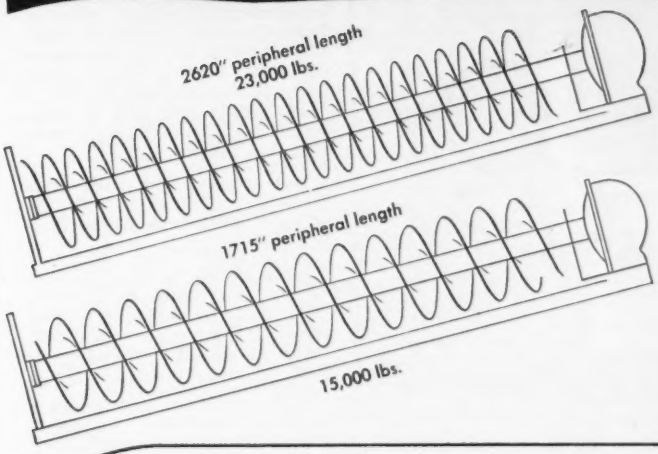
"The main feature in splitting cores with diamond wheels is not necessarily to divide them into two equal portions, but to split the core into unequal sections, so that the smaller segment may be used for record purposes and examination, while the larger portion is used for assaying purposes. I have indicated on the attached sketch the division of the core which we have found most satisfactory, and these dimensions will be suitable for fairly solid core which is not too friable.

"The system of using diamond wheels for this work has the following favorable features:

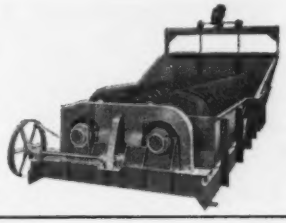
1. Greater volume is obtained for assaying.
2. Storage requirements are considerably reduced.
3. The core may be split in long sections (say, 2 ft. in length), as against the necessity of breaking the core into short lengths to fit the conventional core splitter. This improvement facilitates inspection, and helps to prevent the misplacement of individual pieces.
4. The core may be easily oriented in the holder, so that the split is made along the same section of the core.
5. If the volume of core required for assaying purposes is critical, and where core diameter or size of hole must be as small as possible, an EX core split in this way gives approximately the same volume as an AX core split into two equal portions. This applies generally to the other sizes.
6. Core storage boxes measuring ⅜ in. deep, 12½ in. wide and 18 in. long will store 20 ft. of AX core. This makes a handy size for desk examination, and relieves the strain of carrying around the usual large-size storage boxes. The reduction in weight is important.
7. Cores having hard and soft seams may be divided without fragments being broken off and dropped on the floor. This happens, as you know, when the ordinary core-splitter is used.
8. The accuracy obtained in this new method is measurably greater, as it is difficult to obtain clean division in all types of rock by the usual method of splitting.

"Finally, I believe that the importance of retaining all core recovered is becoming a basic requirement in most operations."

# AKINS classifiers have 50% more capacity




## MORE FLIGHTS
*(Conveying Surface)*
## Per Foot in Akins Construction



The Akins Classifier uses the tightest (shortest pitch) spiral offered for mineral beneficiation. Careful comparative tests* prove that the standard Akins spiral pitch (one-half the diameter) is more efficient than spirals with longer pitches.

Because there is more steel in an Akins spiral, the initial cost is a little more, but this is quickly returned by the profits made possible by dependable steady operation at rated capacity PLUS, or 150% of the longer pitch machine. Write for details of mechanical and metallurgical advantages of Akins design and construction **

*A report of a technical investigation on the comparison of spiral capacities at different pitches is available. Ask for Technical Investigation No. 51.

**Ask for Bulletin No. 48 for closed circuit grinding, or No. 48-S for specialized applications that may solve your particular problem.

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Canadian Locomotive Co., Ltd.....Kingston, Ontario
Head, Wrightson & Co., Ltd.....Stockton on Tees, Eng.
John Carruthers & Co. (Pty.) Ltd.....Sydney, Australia
Head, Wrightson & Co., S.A., (Pty.) Ltd.....Johannesburg

***Authorized Sales Agents***

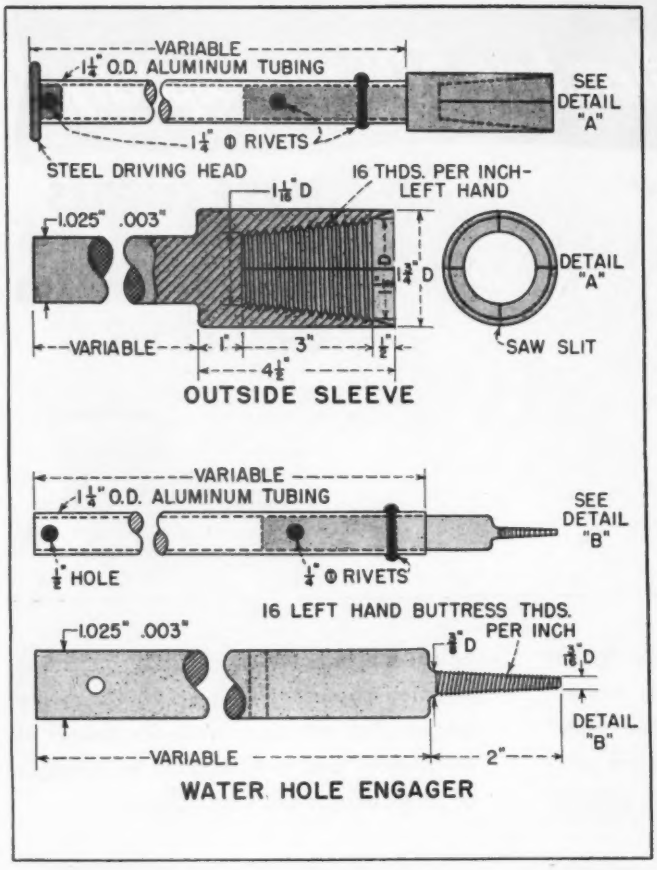
Edward J. Nell Co.....Manila, P.I.
Wright Bros., Credit Foncier Bldg.....Vancouver, B.C.

**NO IMPORTANT AKINS INSTALLATION HAS EVER BEEN REPLACED BY ANY OTHER CLASSIFICATION EQUIPMENT**

THE COLORADO IRON WORKS CO. C I W DENVER

## Colorado Iron Works Co.

**1624 17TH STREET DENVER 2, COLO.**




## How To Fish Out a Broken Drill Rod

As revealed in Bureau of Mines Report of Investigations 4810, the experimental oil shale mine at Rifle, Colo. has not lost a single carbide-insert bit since it started using the fishing tools shown here. They were used to retrieve 1¼-in. drill steel with a ¼-in. water hole. Drill holes were made by a 2-in. bit.

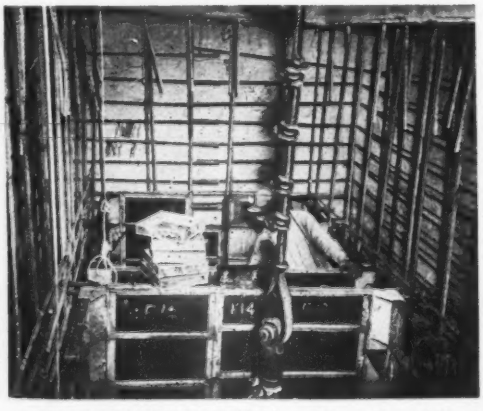
**Steel portions** are made from Max El 3½-in. stock with the threaded portions hardened. Each tool costs about $5.

**Light weight** resulted from use of aluminum tubing for the long parts of the rod. In mines (copper mines, for example) where corrosion is a problem, operators will likely use other tubing.

**If the rod** is not stuck tightly, a permanent magnet on the end of a piece of aluminum tubing will retrieve it. If it is too tightly stuck, . . .

**The outside sleeve** is used where the end of the broken rod is in good enough condition. The sleeve is pushed, hammered, and screwed on, and the rod is retrieved.

**The water hole engager** is used where the end is badly mushroomed, or where the break is too near the bit.



**ALMOST READY FOR POUR** is a 5-ft. section of No. 1 shaft. Keys, wedges, frames and walers are easy to dissemble after concrete has set. Forms were light enough for easy, quick handling.

## Lightweight Forms Speed Concreting of Shafts

At Carlsbad, N. M., Duval Sulphur & Potash Co. materially speeded up the job of concreting two rectangular shafts by the use of sectionalized forms made from magnesium and plywood.

**The two shafts** were the No. 1, a production shaft about 1,558-ft. deep; and the No. 2, a ventilation and supply shaft about 1,463-ft. deep. Both were three-compartment shafts and were lined with concrete to the 825-ft. horizon.

**Frames** were made of magnesium shapes. They were faced with plywood held in place by split rivets. Frames were locked together by means of galvanized slotted keys and wedges, assembled with corner pieces, and the entire structure was reinforced with prefabricated walers. Each 5-ft.-high form (three compartments) consisted of 36 frames and 12 corner pieces.

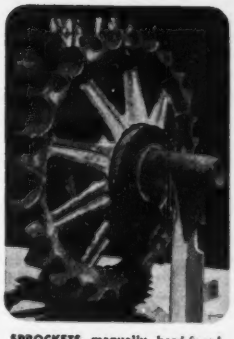
**Result** of the planning was that five men could erect one form (5 ft. of shaft) in two hours.

# STOODY HARD-FACING

**END BLADES** on this bulldozer stay square, retain full blade load when protected with Stoody Self-Hardening 21. Note the cross pattern of stringers which packs a cushion of earth, saving hard-metal.

**TOP CARRIER ROLLS** keep spinning because Stoody 1027 keeps them round.

**TRACK ROLLERS** are ideal for automatic hard-facing. Stoody 105 doubles wear resistance, squares up cupped surfaces, reclaims rollers better than new.



**SPROCKETS** manually hard-faced with Stoody Self-Hardening or Stoody 1027 not only last longer but reduce bushing wear.

**IDLERS** are restored with Stoody 105, applied automatically, for 2 to 1 life increase. Note smoothness of deposit.

## AUTOMATIC HARD-FACING

**With Automatic Hard-Facing now available in nearby job shops, cost reaches a new low, quality is excellent. Ask for recommendations and list of local job shops—Your Stoody dealer, listed in the Telephone Directory "Yellow Pages", will help you—or write direct.**

# PERSONAL NEWS

JAMES D. MASON (left), geologist, succeeds W. B. MILNER as president of Transcontinental Resources Ltd., Vancouver, B. C. W. M. GILCHRIST, (right), mining engineer, has been appointed vice president.

At Consolidated Mining & Smelting Company of Canada Ltd., Trail, B. C., officials have been named to new positions: **R. W. Diamond**, vice president and general manager, has become executive vice president, western region; **G. A. Wallinger**, comptroller, is vice president and comptroller; **R. D. Perry**, assistant general manager, has become general manager; and **W. G. Jewitt**, manager of mines, is assistant general manager and manager of mines.

**R. C. Bell** has been appointed a senior manager of the research and development division of Consolidated Mining & Smelting Co. of Canada, Trail, B. C. He has been at central research laboratory.

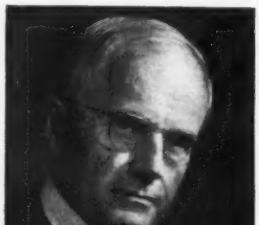
**Benjamin J. Fairless**, president of U. S. Steel Corp., New York, N. Y., and U. S. Steel Co., has also been appointed chairman of the board. Mr. Fairless, president of Carnegie-Illinois Steel Corp., became president of U. S. Steel in 1938. **Roger M. Blough**, executive vice president—law and secretary—was appointed vice chairman of the board.

**George M. Humphrey**, president of M. A. Hanna Co., Cleveland, Ohio, for 23 years, has been elected chairman of the board and chief executive officer. Mr. Humphrey will also continue to serve the four Hanna subsidiaries. **George H. Love**, president of Pittsburgh Consolidation Coal Co., has been named vice chairman of the board; **R. L. Ireland**, former Hanna vice president, chairman of the executive committee; and **Joseph H. Thompson**, former vice president, the third president and chief administrative officer. **G. W. Humphrey** was elected a vice president.

**W. T. Pettijohn**, of Empire Zinc Co., Austinville, Va., has been transferred as superintendent to the company's Empire Zinc Division at Hanover, N. J. Mr. Pettijohn succeeds **S. S. Huyett**, who has been reassigned in Pennsylvania.

**William T. Dible, Jr.**, has joined the Potash Division of International Minerals & Chemical Corp., succeeding **Harold Douthit**, who has been transferred to the company's Plant Food Division.

**W. C. Flinn**, St. Paul, Minn., has been named executive vice president of seven proprietary companies of Great Northern Iron Ore Properties.



DR. PAUL D. MERICA, formerly executive vice president, has succeeded Dr. JOHN F. THOMPSON, chairman of the board, as president of International Nickel Company of Canada, Ltd., New York, N. Y., and its U. S. subsidiary, International Nickel Co.

**Dr. Carlos Paradisi**, director of mines for Venezuela, visited Duluth and the iron ranges during April as the guest of the Oliver Iron Mining Division.

**Arthur E. Manthey**, research engineer with the Oliver Iron Mining Division of U. S. Steel Co., has been transferred to the Oliver research laboratory in Duluth, Minn.

**John J. Forbes**, director, U. S. Bureau of Mines, Washington, D. C., and **George H. Deike**, president and treasurer, Mine Safety Appliances Co., were honored at the Pennsylvania State College Annual Mineral Industries Banquet.

**R. Leslie Beattie**, Toronto, vice president and general manager of The International Nickel Company of Canada, Ltd., has been elected a member of the executive committee of the board and a director of International's United States subsidiary, The International Nickel Co., Inc. **H. C. F. Mockridge**, Toronto, has also been elected to the committee. **J. R. Gordon**, assistant vice president, has also been appointed assistant general manager at Copper Cliff, Ont. **Ralph D. Parker**, assistant vice president, has been elected vice president and director of the company's subsidiary, Canadian Nickel Co., Ltd. **William F. Kennedy** is secretary, succeeding **Henry S. Wingate**, vice president and director.

At The International Nickel Co., Inc., New York, N. Y., **Walter C. Kerrigan**, vice president, has been elected vice president and general sales manager. **L. R. Larson** is assistant vice president and assistant general sales manager. **Theodore H. Dauchy**, **Richard A. Cabell** and **John A. Marsh** are assistant vice presidents.

**James F. King** has been named deputy administrator for International Activities and Defense Materials, Defense Production Administration. Mr. King, Washington, D. C., will be the United States representative on the Central Group, IMC.

**J. Frank Geary** has been appointed head of the Mining Division, Holmes & Narver, Inc., Los Angeles, Calif.

**Bert O. Brand** has been elected vice president and secretary of Vanadium Corporation of America, New York, N. Y. **John J. Spollen** succeeds Mr. Brand as comptroller.

**Norman J. Dunbeck**, Jackson, Ohio, vice president and manager of Eastern Clay Products, Inc., acquired by International Minerals and Chemical Corp., has been elected vice president of International Corp. in charge of the new Industrial Minerals Division.

**R. I. Ludwig** has been elected vice president in charge of mining, milling and refining operations of Bachelor Corp.'s new uranium concentrating plant at Placerville, Colo.

**Fred Osborne**, general superintendent in charge of manufacturing, has been elected president of Sloss-Sheffield Steel & Iron Co., Birmingham, Ala. Mr. Osborne succeeds **Claude S. Lawson**, president since 1948, who did not seek re-election. **Eugene Costner**,

formerly general superintendent of mining, was elected vice president in charge of mining.

**Paul Billwiller** has been promoted to mine foreman at the Bluff mine of Britannia Mining and Smelting Co. (a Howe Sound Co. subsidiary), Britannia Beach, B. C.

**R. D. Bradford,** newly elected vice president, American Smelting and Refining Co., New York, N. Y., has just completed a business trip to Australia and is now visiting the company's properties in South America.

**Morse G. Dial** has been elected president of Union Carbide and Carbon Corp., New York, N. Y., succeeding **Fred H. Haggerson,** chairman of the board. **Walter E. Remmers** has been elected vice president and **Kenneth H. Hannan,** treasurer.

IRVING S. OLDS has retired as chairman of the board of United States Steel Corp. and will resume his law practice with White and Case of New York, N. Y. Mr. Olds will continue as director and member of the Finance Committee of U. S. Steel.

**R. C. Bell** has been appointed a senior research engineer of The Consolidated Mining and Smelting Company of Canada Ltd., Trail, B. C.

**Edwin Sweetman,** mining engineer, has returned to Green Bay, Wis., after a four-month absence in Arizona.

**Cyril S. Kranick** has been appointed sales engineer of Western Machinery Co., San Francisco, Calif., with headquarters in Dunmore, Pa.

**M. E. Fernberg, Jr.** is now with Black's Machine Shop, Bishop, Calif.

**Professor William B. Plank** has retired as head of the Department of Mining and Metallurgical Engineering of Lafayette College, Easton, Pa., a position he had held for 32 years.

**Dr. Stanley W. Sundeen** has been appointed an assistant manager of Cleveland-Cliffs Iron Co.'s iron ore mining and development department at Ishpeming, Mich.

**J. S. Wilbur** has been appointed manager of the ore sales department of the Cleveland-Cliffs Iron Co., Ishpeming, Mich., to succeed the late **William M. Green.** Mr. Wilbur had been assistant manager of the department since 1950.

**John Gernert,** foreman at the Weggum mine, M. A. Hanna Co., Mesabi Range, has been transferred to the Morton mine as head pit foreman.

**J. C. Adamson** has been elected president of Lake Shore Mines, Kirkland Lake, Ont., succeeding **A. L. Blomfield,** who has resigned, but will continue as a director.

**A. E. Cave,** formerly manager of Little Long Lac Gold Mines, Toronto, is now manager of New Mosher Long Lac Mines.

**A. E. Jones** has become chief engineer in the mining department at the Casapalca property of Cerro de Pasco Copper Corp., Peru.

**Solomon Lieb,** formerly general superintendent of the Bolivian Tin & Tungsten Mines Corp., Huanuni, is now with Defense Materials Procurement Administration, Program Development Section, Washington, D. C., as a mining engineer.

**Harry J. Wolf,** consulting engineer of New York, recently examined sulphur and mercury properties in California, and investigated silver and uranium developments in Colorado.

**S. F. Shaw,** of San Antonio, Tex., is temporarily in the Joplin, Mo., area, while investigating some shallow power-shovel mining operations.

**Clifton W. Livingston** has resigned as head of the Colorado School of Mines, Golden, to become president and director of research for Mining Research Corp.

**L. C. Jones** has been appointed chief engineer, Utah Copper Division, Kennecott Copper Corp., Salt Lake City, succeeding **George C. Earl,** retired. **Adolph Soderberg** will succeed Mr. Jones as assistant chief engineer. Mr. Earl will continue as a consultant.

**James D. Ireland** has been elected a director of Cleveland-Cliffs Iron Co., succeeding **George B. Young,** a director since 1947.

E. C. BITZER has resigned as vice president and general manager of Colorado Iron Works Co., Golden, to become metallurgical adviser, with the Raw Materials Division, U. S. Atomic Energy Commission, Washington, D. C.

**Jack Feucht** has been appointed chief engineer of the Cleveland Rock Drill Division of Le Roi Co., Cleveland, Ohio. **Theodore Schmidt** became assistant chief engineer.

**Ernest Klepetko,** metallurgical manager for Combined Metals Reduction Co., Stockton, Utah, retired May 1. A veteran metallurgist of the Anaconda Copper Co. and the U. S. Bureau of Mines before joining CMR, he will continue as a consultant and adviser with Pioche Manganese Co., a CMR affiliate.

**H. J. D. Bambrick** has been appointed mine manager at Dominion Asbestos Mines, Ltd., Montreal.

Four mining men have been awarded medals of honor by the Joseph A. Holmes Safety Association for individual deeds of heroism in saving life in mines and plants of the minerals industry during the past year:

**Dangel Lancaster,** a "hi-hangup man" employed by Climax Molybdenum Co., Climax, Colo., carried to safety a fellow worker who was knocked unconscious by a blast. Mr. Lancaster received severe lacerations, perforated ear drums and a fractured

R. D. BRADFORD (left), formerly general manager of the company's Western Department, has been elected a vice president of American Smelting and Refining Co., New York, N. Y. RICHARD G. CROFT, partner in J. H. Whitney Co. and executive officer of several companies, has been elected a director.

wrist from the blast, but he removed his partner, who was suffering from severe shock, in time to save his life.

**Eddie Lee Colvin,** drillman at the Pyne Mine of the Woodward Iron Co., Bessemer, Ala., entered a stope in the face of an impending blast to assist his partner who had fallen and could not move. The shots killed the partner and Colvin was knocked down twice, after he had almost succeeded in carrying his partner from danger. Mr. Colvin received injuries to his head, neck and leg.

**George Pejko, Jr.,** laborer at the Anaconda Copper Mining Co., Great Falls, Mont., at considerable risk to himself jumped into the Missouri River above the Black Eagle Dam near Great Falls and rescued a small boy from a floating log which was being swept toward the dam by the deep, swift current. Mr. Pejko made the rescue without removing his clothes or shoes.

**J. J. Sullivan,** an Irish immigrant, who was then a miner employed by the Wah Wah Mining Co., near Milford, Utah, carried five men from a drift to the shaft station after they had been overcome by fumes from explosives, later tying them to the crosshead and sent them to the surface. His quick action and considerable risk saved their lives. He was also overcome upon reaching the surface.

## OBITUARIES

**Herman J. Bryson,** 55, North Carolina geologist and member of the Winthrop College faculty, died April 21 in Rock Hill, S. C. Mr. Bryson served as state geologist for 14 years before leaving in May, 1940 to become vice president and general manager in charge of North Carolina operations for a Philadelphia, Pa., mining and development company.

**Robert E. Lee Collins,** 54, professor of geology at the University of Tennessee, died in April from a heart attack.

**Mike Kinsella,** 66, widely known in northwest mining circles, passed away in Wallace, Idaho, March 28. For 27 years he operated leases in the upper workings of the Morning mine near Mullan, Idaho. He was formerly superintendent of Highland Surprise mine and Coeur d'Alene Mines Corp.

**Lawrence D. Hawkridge,** 60, president of Hawkridge Bros., Boston Mass., and a widely known authority on metallurgy and steel-making, died at Cambridge, Mass., April 21.

**Gustav G. Stonmark,** 71, retired assistant engineer for the Oliver Iron Mining Division at the Monroe mine, died at Chisholm, Minn. on April 5.

**Louis McClure,** former underground machine shop foreman from 1922 to 1947 for Hollinger Consolidated Gold Mines Ltd., Timmins, Ont., passed away at North Bay, on March 13.

## CORRECTIONS

**Thomas F. O'Neill has been named geologist in charge of exploration in the Pacific Northwest area for The New Jersey Zinc Exploration Co., a subsidiary of The New Jersey Zinc Co. Mr. O'Neill's headquarters will be in Spokane, Wash.**

**E. M. Stiles is chief engineer for The Consolidated Mining and Smelting Company of Canada Ltd., P. S. Barratt is superintendent, Engineering Department, Kimberly, B. C. operations.**

**Erroneous correspondence led to our printing misinformation on Messrs. O'Neill and Stiles on page 120 of our April, 1952 issue.**

**Elwood D. Shuster,** 84, died at his Franklin, N. J. home on April 30. A graduate of Lafayette College, Mr. Shuster was employed by New Jersey Zinc Co. for 42 years, retiring 14 years ago. He is the author of *Historical Notes of the Iron and Zinc Mining Industry in Sussex County.*

**Russell Hunt,** 71, former vice president of Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., died April 17, at his home in Daytona Beach, Fla. Mr. Hunt joined the company in 1898 as an office boy and retired in 1946.

**Alejandro Reyes Rangel,** 54, and **Juan R. Dueñas,** 51, Central Mexico mining men who did business with Fresnillo Co., were asphyxiated while examining, for prospective purchase, the Morse mine, an abandoned property near Vetagrande, Zacatecas.

**George Cecil Ames,** secretary-treasurer of the Mining Corp. of Canada, passed away in Toronto at the age of 66.

**John H. Marks,** 94, mine consultant active in the profession up to the time of his death, passed away. Mr. Marks was active in mining in Breckenridge in the early days, moving to his Denver, Colo. home 60 years ago. In 1925 the Colorado School of Mines bestowed an honorary Engineer of Mining degree on him.

**Harry Ingalls,** pioneer resident of the Coeur d'Alene district and editor of the *Wallace Miner* from 1938 to 1949, died April 25 at 71 in Yakima, Wash. Mr. Ingalls was secretary of the Copper King Mining Co. and for 16 years was associated with the late Joseph Ingram in an assurance and brokerage business in Mullan, Idaho. He was district correspondent for national mining magazines and since 1944, was a valued and authoritative contributor of news and articles to *E&MJ.*

**Marion Dwight Harbaugh,** president of The Lake Superior Iron Ore Association, died from a heart attack on March 19, 1952 at his home in Hudson, Ohio. A surveyor for the Missouri Highway Department, Mr. Harbaugh decided to finish his education and enrolled in the University of Wisconsin where he received a B. S. degree in Mining Engineering, M. S. degree in Geology, and four honorary fraternal degrees. He became an instructor in geology in the university, then a private consulting engineer and geologist. Secretary of the Tri-State Zinc and Lead Ore Producers Association for eight years, he came to Cleveland in 1936 as vice president and secretary of The Lake Superior Iron Ore Association. He was made president in November, 1951.

**Harrison Morton Lavender,** 62, died at his new home in La Jolla, Calif., on March 21. He had retired as vice president and general manager of Phelps Dodge Corp. because of ill health on March 21. A graduate of the Colorado School of Mines with a M.E. degree, Mr. Lavender served with the Engineering Corps during World War I. He joined Calumet & Arizona Mining Co., Bisbee, in 1924, rising to mine foreman at the 1931 merger with Phelps Dodge Corp. He was mine superintendent, Copper Queen Branch, becoming assistant to the vice president and general manager in 1935. General manager in 1937, he was the force behind the Morenci operation, the East Ore Body at Bisbee, the New Cornelia branch at Ajo, the Lavender Open Pit mine at Bisbee, and the Burrow Mountain Branch at Tyrone, N. M. He was made vice president in 1946 and a director of the company in 1949.

## APPRECIATION

### Fred Wise

Fred Wise, general manager of the Idarado Mining Co. at Ouray and of the Resurrection mine at Leadville, died May 1 at the Presbyterian Hospital where he had been ill from nephritis for six weeks.

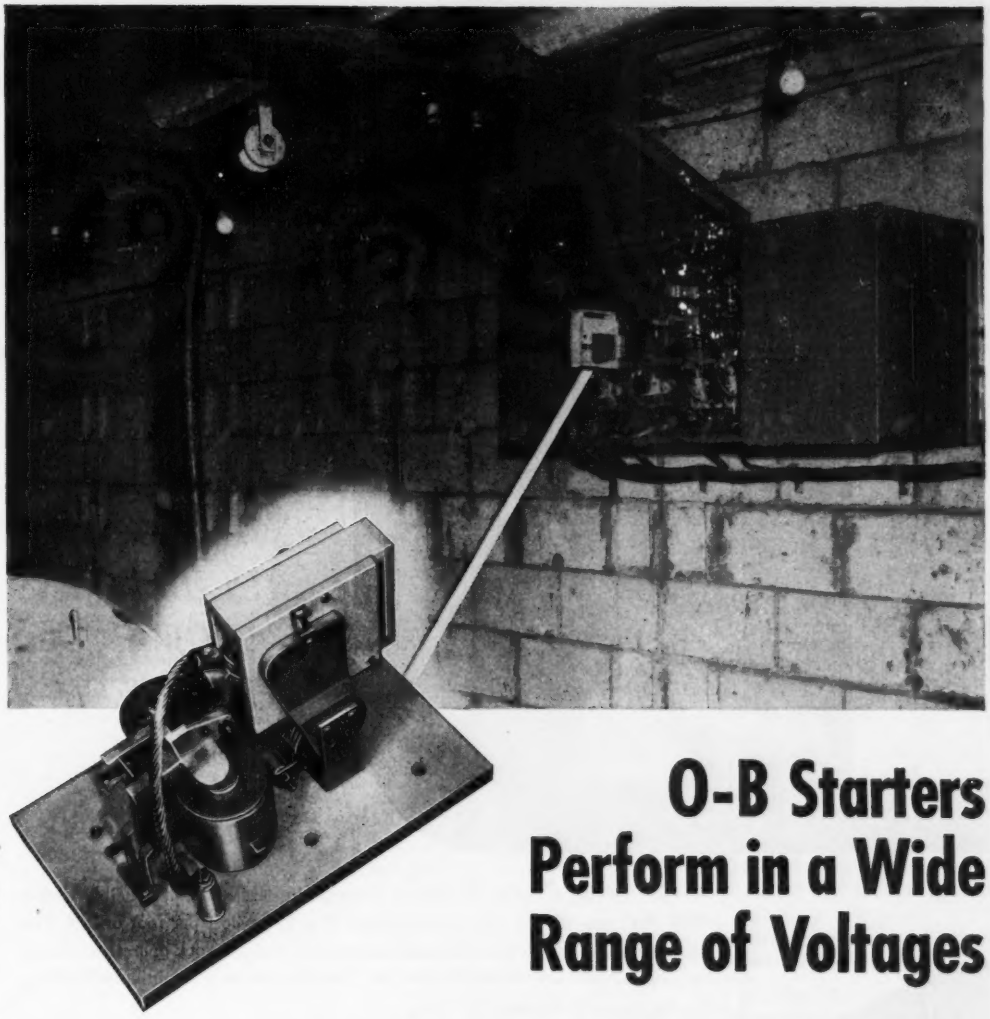
Mr. Wise was born at Virginia City, Nev., in 1906 and, except for service in the United States Navy from 1943 to 1945, spent his entire life in the mines.

While a lieutenant in the Navy, he won distinction by being in the first small group of Seabees that headed the invasion at Salerno. Because of his skill in the use of dynamite, he was required to remove some obstacles set to deter the L.S.T.'s and other landing craft.

Mr. Wise developed and managed a number of mines in California, Nevada, Utah, and Colorado, and was advancing rapidly in the Newmont Mining organization when he was taken ill.

Known to his men and his bosses as a tireless leader, a just and sympathetic friend, and a wise and able administrator, there will be found none in the industry who will not stand up before the world and say, "This was a miner."

FRED SEARLS, JR.



# O-B Starters Perform in a Wide Range of Voltages

Quick, easy access to all parts of the O-B Contactor is a feature mine electricians will appreciate.

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Ohio Brass

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For dependable service throughout the voltage range between your substations and working places, choose an O-B Motor Starter. You'll get contactors that close with a snap at lowest voltages, and contactor coils that do not heat at the highest voltage! You'll get a starter that functions instantly—safely—at work cycle peaks, when current demands are heavy, or during off-shift periods of light load.

Why risk starter troubles, with lost production, while the mine is working? And why take chances on starter protection for pumps or fans when the mine is down? Choose one of the six new O-B Motor Starters for each vital motor, and your starter troubles will be a thing of the past!

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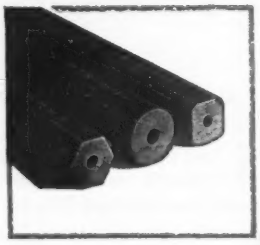
# ON TOP

*or*

# UNDERGROUND

*it's*
*CRUCIBLE*
*HOLLOW*
*DRILL STEEL*
*all the way*



Whether driving a tunnel or clearing a mountain pass — tough Crucible Hollow Drill Steel gets the job done better, faster — at lower cost per foot drilled. This quality steel is built to take the punishment of around-the-clock operation of modern, high air-pressure rock drills. And you have the assurance of minimum breakage . . . and an end to expensive bit loss.

That's because of Crucible's rigid *pre-testing* of every *lot* of Crucible Hollow Drill Steel. What's more, Crucible Hollow Drill Steel is backed by the experience of quality steelmakers. Then too, field metallurgists with broad background on *your* job are available — should you need them.

Insure the quality of your job — cut costs — use Crucible Hollow Drill Steel.

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52 years of Fine steelmaking **HOLLOW DRILL STEEL**

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

REX HIGH SPEED • TOOL • STAINLESS • ALLOY • MACHINERY • SPECIAL PURPOSE STEELS

E&MJ

# NEW PRODUCTS DIGEST

*For further information on these products, circle item numbers on card—insert and mail.*

**FEATURE**

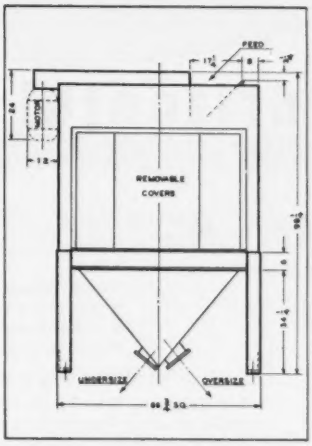
## New Screen Has High Capacity

HIGHER CAPACITY, less floor space and less tendency to blind are the claims made for the new cylindrical screen introduced by Nordberg Mfg. Co., Milwaukee, Wis. Trade-named "Symons" V Screen, the unit will separate wet or dry material from 4 mesh to the very fine meshes.

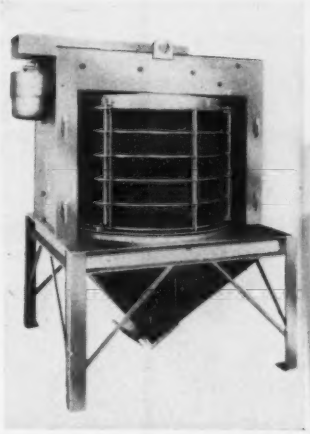
Mounted vertically, the cylindrical screen is 3 ft. high and 12 ft. in circumference, giving 36 sq. ft. of screening surface.

A cupped feed plate with radial vanes sets a little below the upper edge of the drum. Material to be screened enters through an opening in the top of the frame and is impinged by the feed plate against the inner surface of the drum. The oversize particles are held against the screen for a brief interval with the fines passing through. Using 14 gyrations to one drum rotation, each gyration of the drum produces an inward deflection of the material being screened. This frees the holes in the screening surface for the passage of undersize at the next contact and permits the material to drop a short distance. This process is repeated in a similar manner until the particle either goes through the cloth or is discharged as oversize.

With a minimum of height and width, the "Symons" V Screen requires little floor space and is easily installed. Its vertical design makes it particularly advantageous for use under vertical chutes. The unit is completely enclosed assuring dustless operation and easily removable covers permit ready access to the screen. The actuating mechanism is mounted on roller bearings and the vertical frame is constructed of standard steel shapes and plates.




**DIMENSIONS reveal small space requirements for cylindrical screen. This is only size built now.**



**CENTRIFUGAL FORCE throws particles against screen. Oversize drops when screen tilts. Unit is enclosed.**

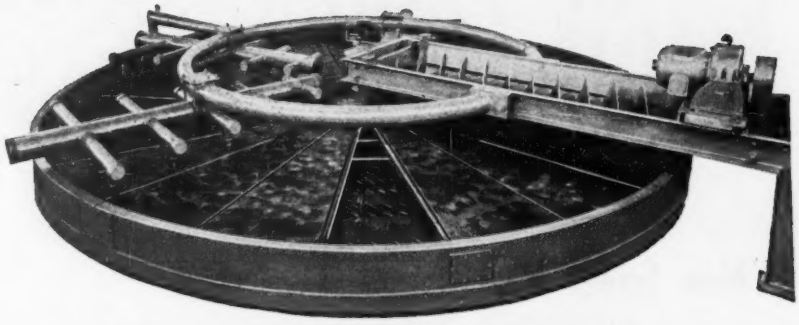
Wear on the cloth is extremely low because there is no sliding action of the particle on the cloth during screening. Whenever the particle and the screen are in contact, both move in the same direction at the same speed. When wire cloth is used, no special forming, hooks or metal reinforcements are needed and the cloth can be changed to a finer or coarser mesh very quickly.

When used for wet screening, water sprays are mounted in the lower assembly with sprays impinging upward and outward to gain greater effectiveness.

The screen is built with various types of discharge bases either wet or dry depending upon installation requirements.

In dry screening the natural fanning action carries the "air float" fines through with the undersize. This fanning action makes the "Symons" V Screen very effective in screening lightweight materials. It has been used successfully in the field for screening pumice, sand, plaster sand, coal dust, copper ore, potash, volcanic cinders, crushed mica, ground phosphate rock, and crushed rock. (1)

# OLIVER



## Horizontal Filter*

### All Flow is Downward Aided by Gravity

AND every operation on the Horizontal Filter that needs to be seen can be seen:

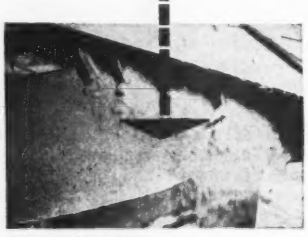
- feed
- cake formation
- rate and effectiveness of dewatering
- direction and distribution of wash
- cake discharge

Nothing of operating importance is hidden.

The Horizontal Filter handles pulps with certain crystalline or fibrous solids or where they tend to settle rapidly. While this filter and the Dorrco somewhat complement one another, the Horizontal offers certain special advantages. It provides exceptionally high capacity and excellent washing. It can handle big tonnages.

If you have a product in the classification outlined above, that requires dewatering or washing, tell us about it in detail. We'll be glad to recommend the best filter to bring about the results you want.

The important fact to keep in mind is that, including the Horizontal and Dorrco, we have four distinctly different continuous vacuum filters for handling mineral products as well as several pressure type filters from which to select. And, further, in making our recommendations we call upon 45 years filtration experience in the metallic and non-metallic mining industries.



Oliver Horizontal Filter
Scroll Discharging Cake

*U.S. Patent Nos.
2,588,912
2,588,976

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MEXICO & CENT. AMERICA
Oliver United Filters Inc.
Oakland, Calif.

INDIA
Dorr-Oliver (India) Ltd., Bombay

EUROPE & NORTH AFRICA
Dorr-Oliver S. A. Brussels
Dorr-Oliver S.N.a.R.L. Paris
Dorr g.m.b.h. Wiesbaden (16)
Dorr-Oliver Co., Ltd., London, S.W. 1
Dorr-Oliver S.a.R.L. Milano
Dorr-Oliver, N.V. Amsterdam-C

PHILIPPINE ISLANDS
E. J. Nell Co.
Manila

HAWAIIAN ISLANDS
Honolulu
A. R. Duvall

WEST INDIES
Wm. A. Powe — Havana

SOUTH AMERICA & ASIA
The Dorr Co.
Stamford, Conn.

AUSTRALIA
Hobart Duff Pty., Ltd.
Melbourne

SOUTH AFRICA
E. L. Bateman Pty., Ltd.
Johannesburg, Transvaal

# Equipment Shorts

**OXYGEN GENERATOR.** A semi-portable oxygen generator is now available for users to produce their own high purity oxygen. Substantial savings are reported. Nothing is consumed by the generator except air and power. The compact unit is 8 by 7½ by 10 ft. The makers, Joy Mfg. Co., Pittsburgh, Pa., contemplate models in the size range from 0.5 to 12 tons daily capacity of 99.5% pure oxygen. (26)

**RUBBER-LINED DRUMS.** Standard 30 and 50-gal. drums are available with abrasion and chemical resistant rubber linings inside, or both inside and outside. Linings are made of ¾ or 5/16-in. five-ply, nonporous uncured natural rubber. Latex Dipped Products Co., Los Angeles, Calif. (27)

**FLEXIBLE HOSE.** A lightweight, flexible hose made with neoprene compounds and laminated nylon chafer duck has been developed by American Ventilating Hose Co., New York, N. Y. For pressure and vacuum services, this wire reinforced Flexaust type has been designed for abrasive dust collection, heavy flexing, gravity feeds. Size range, 1½ to 24 in. inside dia. (25)

**PORTABLE COMPRESSORS.** A ready supply of compressed air, anywhere you want it is the offer of DeVilbiss Co., announcing a new line of portable compressors. The units, in three sizes to deliver 21, 35 or 50 cfm, are mounted on a trailer with a standard hitch for towing. Power is supplied by air cooled gasoline engines. (29)

**PORTABLE PUMP.** Capable of handling 50 gpm against a 25-ft. head, the "Hazelton" Type PE portable pump has a trolley tap and ground connections on a 20-ft. trailing cable. Made by Barrett, Haentjens & Co., Hazelton, Pa., the unit features a 250 v. dc ¾-hp. motor. (30)

**pH METER.** Battery-operated, the Model N pH meter, made by Beckman Instruments, Inc., Pasadena, Calif., is light, compact and rugged enough to be used anywhere—in the field, mine, mill or laboratory. Electrodes cover virtually the entire pH range from 0 to 14 and can safely be used at temperatures from freezing to boiling. The instrument is accurate to closer than .05 pH. Size: 4 x 6 x 9½ in. Weight: 8 lb. (31)

**CRAWLER CRANE.** New ¾-yd. crawler crane with choice of fronts—crane, shovel, dragline or pull shovel—has been announced by American Hoist and Derrick Co., St. Paul, Minn. Machinery platform of Model 375 BC is an integrally rolled steel, electrically welded unit, rather than conventional cast center with bolted on walkways. (32)

**SUBMERSIBLE PUMP.** The "Drain-Pak" is an all bronze pump with stainless steel motor housing. It has no float, no diaphragm, and no electrodes to cause trouble. No lubrication is required at any time. It weighs 31 lb., can be lowered to depths of 15 ft., and will handle 3300 gph. Made by Lancaster Pump and Mfg. Co., Inc., Lancaster, Pa. For specifications and details, circle No. 33 on the card below and mail. (33)

**PLASTIC PIPE.** Higher working pressures are claimed for new Type "WS" plastic pipe of Carlon Products Corp., Cleveland, Ohio. It is available in nine sizes from ¾ to 6 in. Working pressure is 120 psi at 120 deg. F. in sizes up to 1½ in., and slightly less in larger sizes. (34)

**PULLEY LAGGING.** Pulley surfaces can be quickly lagged in place by brush or spray with "Neoprene Pullag," a compound developed by Main Products Corp., Philadelphia, Pa. The compound takes advantage of neoprene's properties to bring pulleys up to full efficiency for slip-free pulley service. (35)

**MINERAL SPECIMENS FOR MICROSCOPE.** Six sets of mineral specimens for microscopical studies in petrology and mineralogy are available from R. P. Cargille, New York, N. Y. One set has 60 minerals and glasses of known refractive index from 1.34 to 2.4, with intervals of 0.01 through most of the range. Valuable for comparison with unknown minerals by immersion method and useful for determining refraction index of unknown liquids. Another set includes 60 powdered minerals. There are three sets, 25 slides each, of comminuted minerals mounted in balsam. The other set has 25 minerals and rocks for demonstration of various optical characteristics. (36)

**SPEED REDUCER.** Double-reduction, shaft-mounted speed reducer with capacity to 43 hp., and for output speeds from 12 to 110 rpm, has been announced by Dodge Mfg. Corp., Mishawaka, Ind. (37)

**ELECTRICAL CONNECTOR.** Installed like any other electrical connecting device, the "Hart-Lock" assures a positive lock by a simple twist of the cap in the connector body. No accidental interruption of electrical service can then take place. Made by Arrow-Hart & Hegeman Electric Co., Hartford, Conn. (38)

**BALL MILLS.** For developing small properties or increasing mill capacity, Denver Equipment Co. (Denver, Colo.), offers the 30-in. "Convertible" ball mill. Muleback portability and easy extension of capacity by addition of 18-in. sections make this a good bet for remote properties. (39)

**LIGHTING FIXTURE.** Greater safety, easier maintenance, greater lighting efficiency are claimed for the AA-51 explosion-proof lighting fixture by the maker, Appleton Electric Co., Chicago, Ill. Available in sizes from 60 to 500 watts, the fixture is listed by Underwriter's Laboratories, Inc., for Class 1, hazardous locations. (40)

## USE THIS CONVENIENT CARD

to obtain further information on products and bulletins mentioned in the New Products Digest. Circle item numbers, tear out and mail.

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| 3 | 10 | 17 | 24 | 31 | 38 | 45 | 52 | 59 | 66 |
| 4 | 11 | 18 | 25 | 32 | 39 | 46 | 53 | 60 | 67 |
| 5 | 12 | 19 | 26 | 33 | 40 | 47 | 54 | 61 | 68 |
| 6 | 13 | 20 | 27 | 34 | 41 | 48 | 55 | 62 | 69 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 | 70 |

My Name ..... Position .....

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# For Your Files

This informative manufacturers' literature is free unless otherwise specified. To obtain bulletins circle their numbers on card below and mail.

**POWER WHEELBARROW.** Steadily increasing versatility of the Moto-Bug is illustrated with on-the-job photographs in a four-page folder issued by Kwik-Mix, Port Washington, Wis. The gasoline-powered (6 hp.) unit is light and narrow and can use a variety of attachments for special tasks. (41)

**THERMISTORS.** These are electronic semiconductor control elements whose electrical resistance responds negatively to minute temperature changes. Just why this makes thermistors good for temperature controls, time delay devices, flowmeters, overload protectors, voltage regulators and switching devices, is clearly explained in catalog TH-5 put out by Carboloy Department, General Electric Co., Detroit 32, Mich. The balance of the 30 pages gives wiring diagrams, curves and other engineering data. (42)

**CAB COOLERS.** Smelters and foundries can take the heat off their overhead crane operators. A complete line of cab coolers and conditioners is described and illustrated in a 24-page bulletin which comes from the Dravo Corp., Pittsburgh, Pa. (43)

**MINERAL JIG.** A self-contained unit consisting of cells, screen baskets, and a completely enclosed "package drive" is discussed in detail in a four-page folder published by Yuba Mfg. Co., San Francisco, Calif., on their M-8 42 x 42-in. mineral jig. (44)

**POWER SHOVELS.** Four good bulletins are being offered by different companies on power shovels and related equipment. Just circle the numbers of the ones you want for your files:

"4-Rope Buckets," 44 pages; Blaw-Knox Co., Pittsburgh, Pa. (45)

Handy digest of current models of cranes, shovels and draglines; Link-Belt Speeder Corp., Cedar Rapids, Iowa. (46)

Rapier 1 cu. yd. shovel, dragline and crane, 20 pages; Ransomes & Rapier Ltd., London, Eng. (47)

Complete line of equipment, 32 pages; American Hoist and Derrick Co., St. Paul, Minn. (48)

**DIESEL EXHAUST CONDITIONING.** "The Mechanics and Chemistry of Diesel Exhaust Gas Conditioning" is the title of a four-page, newsletter-type folder published by Ruth Co., Denver, Colo. It offers a simplified explanation of how a scrubber works. (49)

**ADJUSTABLE FLOW VALVES.** Catalog No. 713 tells all about a valve which is adjustable at any of the 10 dial positions to produce a flow rate of any desired characteristics. Available in straight-through or angle types, from 1 to 4-in. in size, the valves offer flow control for air and gas systems. Hauck Mfg. Co., Brooklyn, N. Y. (50)

**ROTARY FILTER.** A 3 x 2-ft. rotary filter with the drum cast in one piece is discussed and described in a four-page folder from Denver Equipment Co., Denver, Colo. Folder contains dimensional drawings and photographs. (51)

**DEWATERING MACHINERY.** Continuous thickening screens, screw-type dewatering machine, and continuous roller-type dewatering press are described in operation and construction in bulletin No. 551 issued by General American Transportation Co., Chicago, Ill. (52)

**CONVEYOR BELT REPAIR.** "Magic-Vulc," a self-(cold)-curing plastic rubber compound offers a practical low cost way to repair conveyor belts according to the manufacturers, Magic Chemical Co., Brockton, Mass. Interesting folder shows how easy it is to apply. (53)

**ROCK BITS.** Forged steel rock bits in three socket series and seven types of hollow steel drill rods are described and illustrated in catalog V-1708, available from Drill Bit & Tool Co., Midland, Pa. Bit sizes range from 1¼ to 2⅝ in. (54)

**ATOMIC-HYDROGEN WELDING.** In addition to explaining the process of atomic-hydrogen welding, bulletin GEC-598A of the General Electric Co., Schenectady, N. Y., describes recently designed power generating equipment and lists its specifications, applications and advantages. (55)

**PLANT MAINTENANCE.** Plant look run-down? Here's a bulletin on special contings for plant maintenance which describes the use of various industrial products for problems like skidproofing, rust prevention, painting over damp areas, weatherproofing and decorating exterior masonry, interior waterproofing, painting over hot surfaces, protection against acid and chemical fumes. United Laboratories Inc., Cleveland 12, Ohio. (56)

**ARIDIFIER.** In case you're asked, the "Aridifier" is a mechanical cleaner that removes 92% of oil, moisture and dirt from compressed gas and air lines. Catalog 252 tells all about it; how it works, where to use it, what it does. Logan Engineering Co., Chicago, Ill. (57)

**HARDSURFACING.** "What Hardsurfacing Can Do for You" is the provocative title of a catalog issued by Rankin Mfg. Co., Los Angeles, Calif. It contains specific information on hardfacing procedures and indicates the savings to be effected by the use of hardsurfacing over part replacement. (58)

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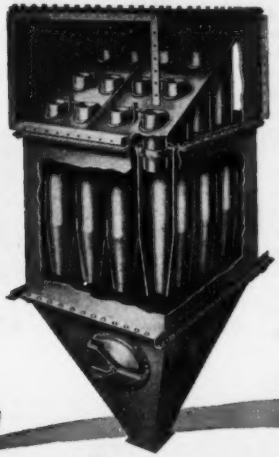
**Before you buy *any* equipment for recovering dust or fly ash . . .**



# COMPARE ALL OTHERS against MULTICLONE'S Multiple Advantages

**Because the advantages of MULTICLONE are so clear-cut, so vitally important, so far-reaching in the savings they make, we urge you to make a factual unbiased comparison of MULTICLONE dust and fly ash collection equipment against *any other* in the mechanical recovery field. Only by making such a comparison can you fully appreciate the major savings and greater performance you get by installing MULTICLONE Collectors!**

## COMPARE Recovery Efficiency!

It is a recognized fact that the separating efficiency of a cyclonic tube increases as the tube diameter decreases because smaller tubes generate greater centrifugal forces. The patented vane in the MULTICLONE makes the use of small tubes *practical* without complicated manifolding and permits compacting many small tubes into one simple, highly efficient unit. MULTICLONE's higher centrifugal forces throw out not only the large, medium and small particles, but also an unusually high percentage of the *extremely small* particles of 10 microns and less. Result—*more complete recovery of all suspended particles from the gas stream!*

## COMPARE Space-Saving Compactness!

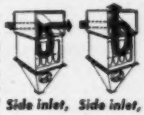
Plant space costs money—particularly at today's high construction costs. Because the MULTICLONE is more compact, size for size, it makes *really important* savings in space and plant costs. Note in the chart how the MULTICLONE requires substantially less space—*both in floor space and cubic space*—than any other unit of comparable capacity and performance. *This means vital savings in construction costs!*

| Make | Relative Space Requirements In Sq. Ft. | In Cu. Ft. |
|---|---|---|
| Multiclone | 1.0 | 1.0 |
| Collector A | 2.1 | 1.8 |
| Collector B | 5.9 | 3.2 |
| Collector C | 6.8 | 3.9 |

## COMPARE Dollar-Saving Adaptability!

Savings in space is just one of many ways MULTICLONE reduces installation costs. Because the shape of the unit can be readily varied (long and narrow, short and wide, or square) to fit available spaces, the MULTICLONE can often be tucked into odd corners and waste areas too restricted for other equipment.

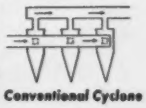
Moreover, inlet-outlet ducts can be varied—side-inlet side-outlet, or side-inlet top-outlet—to meet low headroom or restricted side clearance requirements . . . and the single-inlet single-outlet duct design permits greater flexibility and simpler installation. *These all add up to vital savings in installation costs!*



**Side inlet, Side outlet** **Side inlet, Top outlet**

## COMPARE All-Around Simplicity!

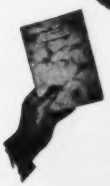
The MULTICLONE is simple and inexpensive to maintain because there are no highspeed moving parts to repair or replace . . . no pads or filters to clean or renew . . . nothing to choke the gas flow or increase draft losses as suspended materials are recovered. In addition, the square, flat-sided shape of the MULTICLONE and its straight inlet and outlet ducts are far simpler to install and insulate. And since the recovered material from an entire bank of tubes is collected in a *single* hopper, it is much easier to service and maintain than the multiple hoppers of conventional cyclone units. *Here again, the* MULTICLONE *saves in many ways—all of them important!*



**Conventional Cyclone**

**Multiclone**

**Whether your recovery installation is in a new structure or for modernizing present equipment, you will be far ahead by installing MULTICLONE Collectors. Our experienced engineers will gladly make helpful suggestions for simplifying your recovery problems. A letter, wire or call to our nearest office places this assistance at your service without obligation.**



**Send for Helpful Literature!** This factual MULTICLONE literature explains the basic principles of cyclonic dust recovery and gives technical data helpful to anyone contemplating a dust or fly ash recovery installation. Write today for your free copy!

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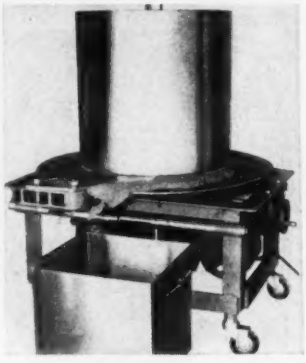
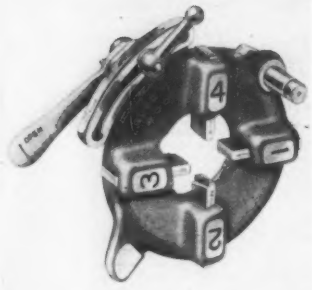
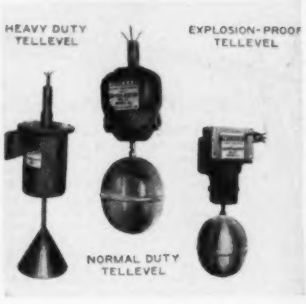
**CONTROLLER,** electronically operated, functions where both time and temperature are important process factors. Integral-program cam mechanism automatically positions instrument control point in accordance with predetermined program. Minneapolis-Honeywell Regulator Co. (2)



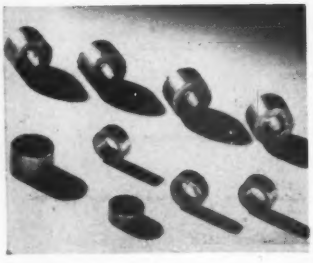
**FEEDER** handles any sticky material, like filter cake, clay, damp salt. Cylindrical shell and plate rotate on same shaft, separated by a variable gap. Stationary plow controlling feed rate, extends through gap. Feed rates on different models range from a few pounds to 50 tph. Pulva Corp. Perth Amboy, N. J. (3)



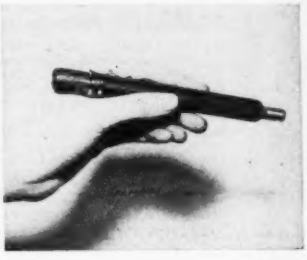
**DIE HEAD** is instantly adjustable to thread 1 in. to 2 in. pipe, including over and undersize, regardless of position of quick-opening lever and without removing dies or die head from machine. Ridge Tool Co., Elryia, Ohio. (4)




**BIN-LEVEL CONTROL,** the "Tellevel," automatically stops the conveyor when the bin is full. As material piles up under it, the float tilts actuating electric switch. Heavy-duty unit is for ore with lumps bigger than ¾ in. Stephens-Adamson Mfg. Co., Aurora, Ill. (5)



**SEMI-METALLIC** packing base used in die-formed rings or washers fills in minor irregularities in machined stuffing boxes, bonnets, glands. (6)



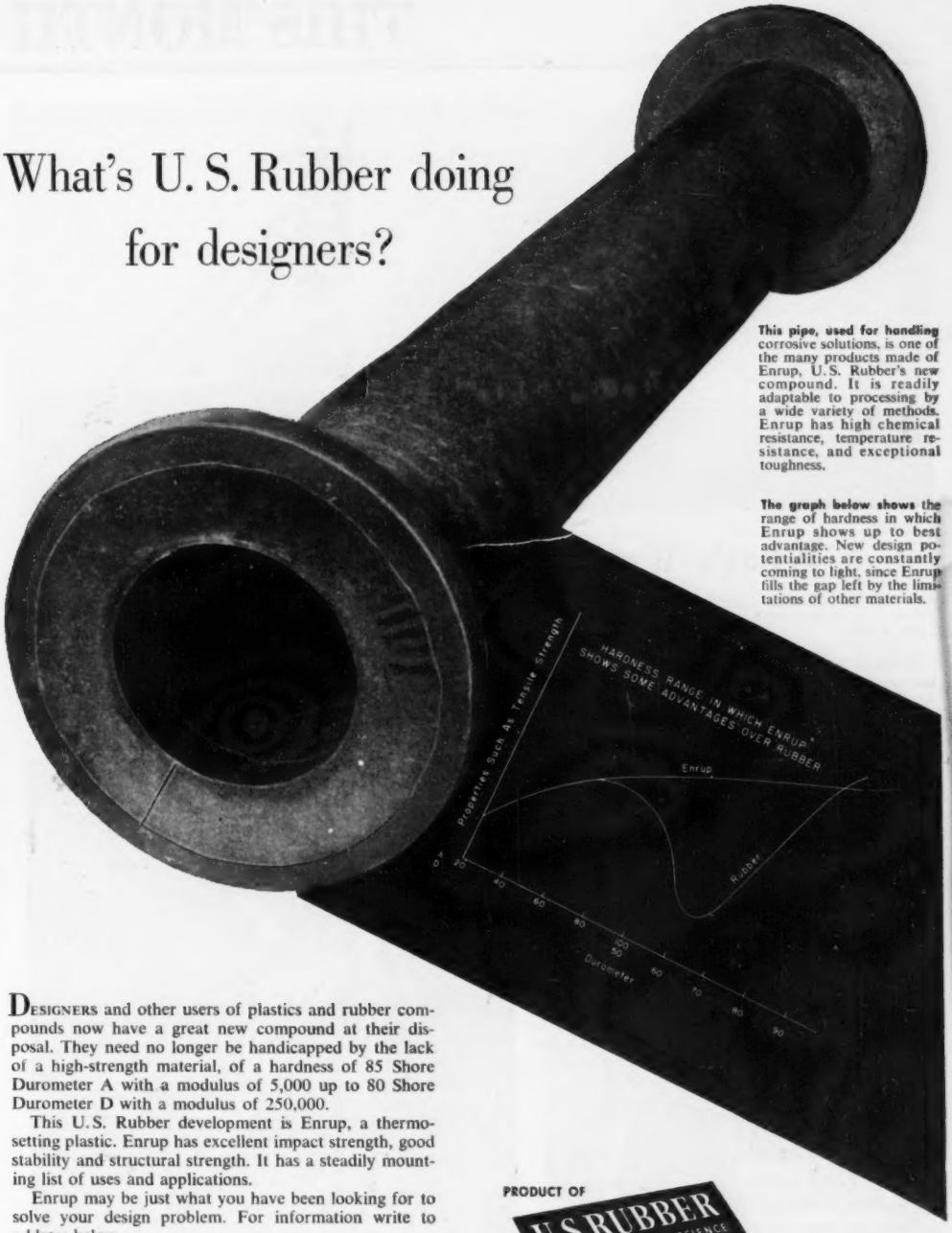
**MAGNETIC PROBE** is useful for removing iron or steel particles from hard-to-reach places in delicate mechanisms, including the human eye. Price $6.50 or $75 a doz. General Scientific Equipment Co., Philadelphia, Pa. (7)

**BLASTING UNIT** is capacitor-operated for firing from 1 to 10 shots simultaneously. Belt carrier makes it easy to shoot from the hip. Mines Safety Appliances Co., Pittsburgh, Pa. (8)

**AQUAMETER** provides quick, simple moisture determinations on almost any type of material. Electrically controlled unit completes automatic titration in less than two minutes. Beckman Instruments Inc., South Pasadena, Calif. (9)

For more information, use convenient reply card opposite p. 118

# What's U. S. Rubber doing for designers?




**This pipe, used for handling** corrosive solutions, is one of the many products made of Enrup, U.S. Rubber's new compound. It is readily adaptable to processing by a wide variety of methods. Enrup has high chemical resistance, temperature resistance, and exceptional toughness.

**The graph below shows** the range of hardness in which Enrup shows up to best advantage. New design potentialities are constantly coming to light, since Enrup fills the gap left by the limitations of other materials.

DESIGNERS and other users of plastics and rubber compounds now have a great new compound at their disposal. They need no longer be handicapped by the lack of a high-strength material, of a hardness of 85 Shore Durometer A with a modulus of 5,000 up to 80 Shore Durometer D with a modulus of 250,000.

This U.S. Rubber development is Enrup, a thermosetting plastic. Enrup has excellent impact strength, good stability and structural strength. It has a steadily mounting list of uses and applications.

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# THIS MONTH

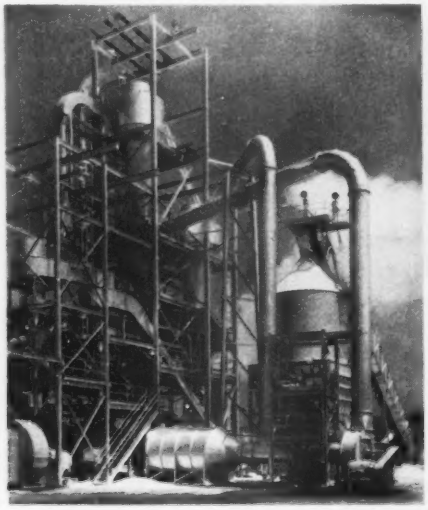
## What's Wrong with This Headframe?

NOT A THING ACTUALLY, but chances are it's the first headframe you've seen with backlegs on the side opposite the hoist house.

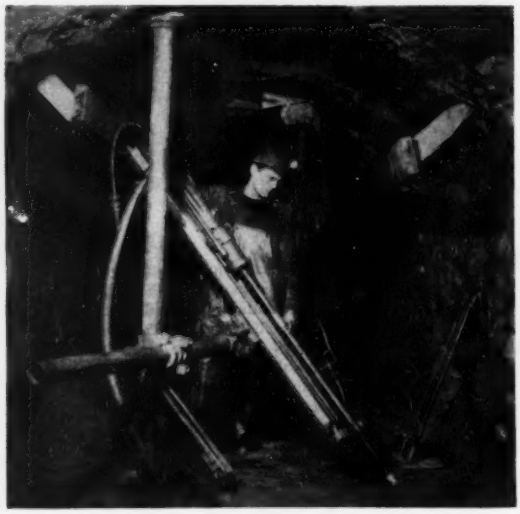
**Reason:** Tennessee Copper Co. engineers wanted a large unobstructed area between the headframe and hoist house. So they put the backlegs on the other side, designed them for tension during hoisting rather than compression.

This Central shaft at Copperhill, Tenn. will service all the company's mines in the vicinity except the Isabella, and is expected to be in operation by the end of this year. A 10-ton counterbalance skip working on a 90-second cycle will handle 400 tons of ore an hour from the 1200 level.

The 12-ft. dia. hoist is powered by a 1,000-hp. electric motor. Chute arrangement between the backlegs is for loading waste directly into trucks.



**New diatomite plant** at Lompoc, Calif. makes much use of outdoor construction. Dicalite Division of Great Lakes Carbon Corp. began actual production on April 15. It increases Dicalite's diatomite capacity by 80%.



**Blasthole miner at INCO** drills holes up to 75 ft. in depth. He is using tungsten-carbide bits on sectional steel. Typical slice broken by blastholes is 60,000 tons. Method is used in tougher ore, where induced caving will not work. Both methods work well at INCO's big new underground operations.

# IN MINING

## Soviet Uranium Mining: Forced Labor, "Five Cigarettes and a Glass of Beer Free"

LATE IN 1951, a high-ranking official of the Soviet-operated mines in Saxony (southeast Germany) made his way to our side of the Iron Curtain. Part of his disclosures are in a 19-page memorandum he wrote, "Soviet Operation of Uranium Mines in Eastern Germany." Excerpts follow:

**Uranium ore** was found in the following districs: Zwickau, Schneeberg, Aue, Oberschlem, Schwartzenberg, Annaberg, Johangeorgenstadt, Marienberg, Freiberg, Freitahl, and others. Many of these mines were opened and equipped 20 or 30 years ago, and were operated as silver and cobalt mines. In 1945, only the coba't mines, the Weisser Hirsch and Schneeberg, were in operation. [Note the occurrence of cobalt with uranium.]

**The organization.** "Vismut Corp. consists of a central office and 27 corncerns, six of which are classified as major concerns. The central office is located in Aue." This corporation is a part of the USSR Ministry of War Industry. Its slogan for worker inspiration is "[uranium] ore—weapon of peace."

**Woman miners.** Of underground workers, 5% are women; on the surface, they account for 30% of the hands.

**Pay.** Underground workers are highest paid: They earn an average of 400 marks. They are issued special rubberized suits and rubber boots every eight months. But the suits wear out in four months and workers are usually obliged to work in their own clothes.

**Food.** Underground workers get larger rations than the surface workers. Top rations go to the officials of the Socialist Unity Party, the trade unions, and police of the concerns. "Stalin's parcels" go each month to those who have overfulfilled their quotas—but these filter down through members of the Socialist Unity Party and trade unions. Workers then get what is left of them.

**Ore.** "The ore processed by Vismut varies from 4% to 17% uranium. . . . All ore containing less than 6% of uranium is subjected to the concentration process before going to the USSR." It is exported in 50 kilogram cases (about 110 lb.) [This grade of ore seems rather high to *E&MJ* staff members. But if mining were highly selective, that grade would agree fairly well with pitchblendes produced in pre-Hitler days at St. Joachimsthal in Czechoslovakia. St. Joachimsthal produced 5 g. of radium from 180 to 190 annual tons of pitchblende, and the probable ratio was 5.2 tons of uranium salts per g. of radium. That would make 26 tons of uranium salt from 180 to 190 tons of ore (very likely hand-sorted), for an average grade of about 14%.]

**Incentive.** Vismut introduced socialist competition to the mines in its attempt to step up under-quota production: "Workers competed against worker, brigade against brigade, mine against mine, and concern against concern." Supervisors were told that "the Germans must be well and justly treated, but one must not be too lenient with them. The Germans were very grasping and that was why, when necessary, opportunities to earn a few marks extra shou'd be offered to them." On days when high officials arrived, the food became vastly better: One day when Saxony's Prime Minister Seidvitz arrived in Schneeberg, "every worker whose name appeared on a list received five cigarettes and a glass of beer free."

**The complete report** was published by the East European Fund, Inc. (part of the Ford Foundation), 401 W. 118, New York, N. Y. Cost: 25¢.

## Permionic Membrane—Cheap Fresh Water From Oceans; Low-Cost Mineral Recovery

HERE'S A NEW DEVELOPMENT which may have a big effect on our lives in general and on extractive metallurgy in particular. It's called the Permionic Membrane, a tool for demineralization of water.

Perhaps its promise of cheaply producing fresh water from sea water is the most exciting. Sea water flows into a Permionic system and is divided into two streams—a concentrated solution of salts (about ⅓ of the feed), and a virtually salt-free water (about ⅔ of the feed). The system requires electrical power, but no heat or chemicals. The membranes are plastic, made largely from cheap coal-tar and petroleum chemicals, and are amenable to mass production. They are continuous plastic membrane films about 10 to 40 t ousandths of an inch thick, and have high ion selectivity, electrolytic

### Events for Mineral Men

**June 23-27, ASTM,** 50th anniversary meeting, Hotel Statler, New York, N. Y.

**July 1 to Sept. 30, Centennial of Engineering,** Chicago, Ill.

**Sept. 8-15, International Geologic Congress,** annual session, Algiers, Algeria.

**Sept. 22-25, American Mining Congress,** metal and nonmetallic mining convention and exposition, Denver, Colo.

**Sept. 23-25, Institution of Mining and Metallurgy,** symposium on mineral dressing, London, England.

**Nov. 6-8, New Mexico Mining Association and International Mining Days,** Albuquerque, N. M.

**Dec. 7-10, American Institute of Chemical Engineers,** annual meeting, Hotels Cleveland and Carter, Cleveland, Ohio.

**Feb. 16-19, AIME,** annual meeting, Statler Hotel, Los Angeles, Calif.

### Your Guide to "This Month"


**122-127. Feature News:** The uranium story above tells what Russia is doing in Germany. The one on page 126 tells what Canada is doing at the 'hot' new Beaver Lodge field

**127-131 The 1951 Annual Reports** in brief.

**132-160. In the United States:** Nearly every month there's news of new medium-size iron-ore mines in the California-Nevada area. See page 146.

**160-169. In Canada:** The Chibougamau area of eastern Quebec is seeing intense activity.

**169. In Africa:** A deep drill hole in Orange Free State has intersected 2.5 ft. of 5.5-oz. gold.

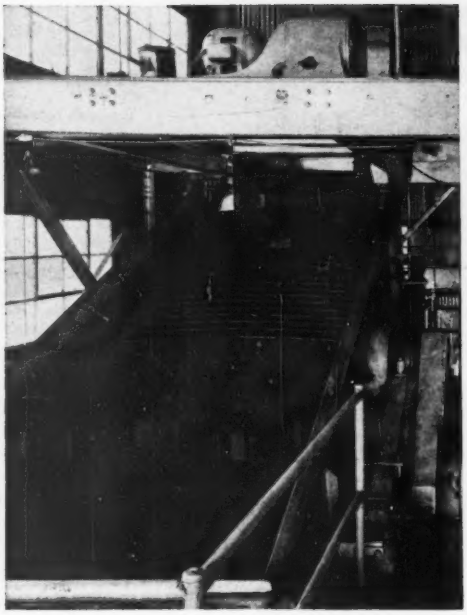
**169-171. In Australia,** gold producers (460 to date) have organized to sell 'premium' gold.

**171-172. In Europe:** Spanish pyrite is booming.

**173-174. In Latin America:** Guatemala may encourage mining and other enterprise.

**174-175. In the Philippines:** Paracale comes back.

HEWITT-ROBINS



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conductance, and hydraulic resistance.

But it also promises to purify tailings, mine waters, mineral-containing wastes from a wide variety of industrial processes.

**The Membrane** works in a way similar to conventional ion exchange, but it has this major advantage: In ion exchange, the solution passes through towers where salts are collected by resins, and the resins must then be regenerated. The Permionic Membrane is a selective ion-transfer membrane which allows for continuous processing in which the energy of regeneration is supplied by continuous electrical input.

**History.** Ion transfer membranes had been known and studied for some time. The human body, handling minute traces of chemicals, has hundreds of them. The difficulty was that natural membranes were fragile and scarce, and synthetic ones could not be made strong, cheap and reproducible enough for commercial use. In 1948, with background, men and patents in the field, American Research and Development Corp. formed Ionics, Inc. (152 Sixth Ave., Cambridge, Mass.). The purpose of Ionics was to do consulting research and process development in the fields of ion exchange and ion transfer membranes. It has been marketing the membranes for several years. President is Dr. E. R. Gilliard; vice president, Dr. Walter Juda; and supervisor of patent department, Wayne A. McRae.

**Economics.** The amount of electrical energy supplied to the membranes varies with the flow and concentration of minerals in the incoming solution. At low flow rates (near peak efficiency), purifying sea water requires about 20 kwh per 1,000 gallons of fresh water. So at 0.3¢ per kwh, the cost of electricity (excluding installation and other operating costs) is about 6.0¢ per 1,000 gallons. That compares with existing rates for delivered irrigation water of up to 20.0¢ per 1,000 gallons, and for residential water of up to 30.0¢ per 1,000.

In mineral extraction, where the concentration of minerals or chemicals is low, the power requirements would be relatively much smaller per 1,000 gallons of feed. As per the company's bulletin "Permionic Membrane Demineralization," from which this information was taken, "the electrical energy consumed in purification of many common brackish waters may be as little as 1¢ per 1,000 gallons."

## White Pine Village Will Have 3,600 People in '55

A COMMUNITY cut out of the woods —from 25 inhabitants to 3,600 in three years—that will be the story of White Pine, Mich. Pace Associates of Chicago are now drafting plans which call for construction of 200 homes a year for the next three years. The village, complete in every respect, will have

BINGHAM. . .LIBBEY. . .HOLDERER. . .BRADEEN. . .HENDRYX

## In Oregon, Cavemen Boss the VIPs

THOUGH THE SOVIETS may run this as a picture that proves the Revolution has come to Oregon, we're taking that risk. The Soviet Press ran a similar picture a while ago; it showed Governor Dewey and a group of Oregon serfs.

**The truth** is that this picture shows the Grants Pass Cavemen initiating five important mineral men into their society. It took place on April 28 at a meeting of the Oregon Mining Association. The initiates (they're the ones dressed like Wall Street bankers): Mason Bingham, chairman of the Governing Board, Oregon State Department of Geology and Mineral Industries; Fay Libbey, director of the Department; George B. Holderer of DMPA; O. C. Bradeen, regional director of GSA; and H. E. Hendryx of the State Governing Board.

schools, community hall, power plant, and other facilities. In addition to the planned development, an equal number of homes will be built in the area adjacent to the company-provided facilities.

**Copper Range Co.** expects to hire 1,800 employees, and believes that 40% will commute from nearby Bergland and Ontonagon.

**Turner Construction Co.**, holders of the general construction contract for the White Pine project, will be letting subcontracts at the rate of more than a million dollars per month during the next year. In the second year, the total will be $23-million.

**The mine** is expected to be in partial production by July 1, 1954, and in full production by Nov. 1, 1954.

## Urawira Will Build 1500-Ton Lead-Copper Mill

URAWIRA MINERALS, LTD., has awarded a contract to Southwestern Engineering Co. for construction of a 1500-ton-per-day mill at its Mpanda mine in Tanganyika. It is scheduled to start production in January of 1954.

**Money** for the project came half from a United States MSA loan, and half from counterpart funds furnished by Urawira.

**Southwestern Engineering** will design and specify equipment for mine surface plant, shops, crushing, heavy-media, grinding and concentrator sections, laboratories, hospital, and other units. "The incorporation of a SWECO Heavy-Media-Separation unit in the flowsheet will make possible the rejection of approximately 50% of the mined ore as waste, reducing the concentrating section to a 700 ton per 24 hour unit," according to H. V. Hughes, manager of the SWECO Industrial Division.

## Oregon Chrome Miners Get Production Incentives

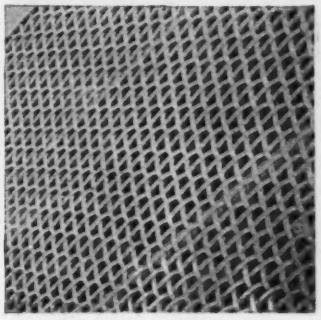
OVER 300 PERSONS interested in chrome mining met with government officials at Grants Pass on April 28, under the auspices of Oregon Mining Association. As a result, chrome purchasing schedules will be more than doubled, the access-road program got a boost, and the chrome miners plan to form an organization.

**Purchasing.** George B. Holderer, chief of the Ferro-Alloys Division of DMPA, announced that the limit of purchases from any one source would be raised from 2,000 to 5,000 tons per year. Miners were pleased.

**Roads.** Officials from each of the national forests in the chrome area were at the meeting to discuss new access roads. Miners were urged to present applications for roads to Stanley M. Walker, DMPA, Washing-

*(Continued on page 126)*

HEWITT



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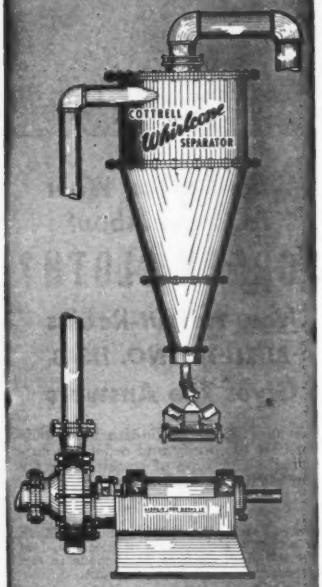


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ton, D. C., so that surveys could be made as soon as possible.

**Organization.** F. I. Bristol, president of Oregon Mining Association, recommended that chrome miners form their own organization so that they could deal with Washington as a unified group.

**Potential.** Fay Libbey, director of the Oregon State Board of Geology and Mineral Industries, said that his office recently conducted a survey of chrome operators. Twenty-four percent of those contacted answered, and estimated they could produce 216,000 tons during the three-year chrome-purchase period.

## Israel Government Will Exploit Negev Copper

ON MAY 4, the Israel Government and Societe Belgo-Continentale des Minerais et Metaux signed a "preliminary agreement" which will result in early development of copper deposits in the Negev Desert of Israel. Total cost is estimated at about $2-million. The Belgian firm will give technical aid and assistance in planning, but exploitation and ownership will be in the hands of government-owned Israel Mining Industries Ltd. (About $1.5-million raised in the U.S. has been invested in that company.)

**Ore is said** to run about 2 to 8% copper, but reserves have not been fully established. The plant will be built about 30 klm. north of Eleath; in about a year or 18 months, it is expected to be producing 10 tons of copper metal daily. A road is being extended through central Negev now.

## Maine's Manganese is Big But Low in Grade

GOV. FREDERICK G. PAYNE, Maine, says new surveys have shown that there is more than twice as much ore than was previously estimated, and that recoverable manganese per ton is greater. Previous estimates set the figure at 100-million tons, so the new figure must be greater than 200-million. The USBM is continuing to drill deposits in Aroostook County.

The estimates are still conservative, Payne said, "and when a suitable process for extraction is developed, northern Maine should become a veritable manganese 'El Dorado'." [Please note Chemico's reference to manganese beneficiation, page 86.]

## Hillside Mining Starts Custom Tungsten Mill

OPERATION of custom mill to treat tungsten ores began early this month at the Hillside Mining and Milling Co. plant near Prescott in Yavapai County. E. G. Green, superintendent, said a tentative schedule calls for a $6 per ton milling charge plus 10% of net returns.

**The tungsten unit** at the mill is an addition to the present lead-zinc-copper concentrator. A gravity plant of 300 tons capacity will treat the Hillside and also custom ore. The section includes crushing and grinding equipment with concentration by flotation, tabling, and magnetic separation. Principal production will come from the nearby Tungstona and Black Pearl mines.

**The Tungstona** is operated by Hillside, which has done extensive development during the past year. Ore averages 0.25 to 0.40% $WO_3$.

**Production at the Black Pearl** is under supervision of Edgar A. Scholz and J. H. Cazier. The mine has been an intermittent producer since its discovery in 1914. Its output has been equivalent to slightly less than 4000 units of 60% $WO_3$ from ore containing about 0.78% $WO_3$.

## ASARCO Resumes Vulcan Development Work

IT WAS ANNOUNCED at the annual stockholders' meeting of Day Mines, Inc. that American Smelting and Refining Co. would resume development at the 3,000-ft. level of the Vulcan shaft near Wallace, Idaho, about May 1.

Day has a 25% participating interest in the long-term lease and profit-sharing agreement between ASARCO and Vulcan Silver-Lead Corp. Except for some underground diamond drilling, development has been suspended since January, 1951. Since that time ASARCO has repaired the Vulcan shaft and installed heavier equipment at the property.

## Beaver Lodge Now Looks Like Major Uranium Area

WITH A NEW leaching plant going up, a small city to come, and widespread exploration and development there, Beaver Lodge Lake is now viewed by experts as one of the major uranium areas in North America.

**Eldorado Mining** and Refining Ltd. is building a uranium leaching plant near Beaver Lodge Lake, Saskatchewan. The plant is scheduled for first operation in April, 1953, and will have an initial capacity of 500 to 700 tons per day. The company "definitely has a uranium mine" at its Ace Lake property. The Ace shaft has opened important tonnages of pitchblende, and the Fay—with five compartments—is now going down to 1,200 ft.

**This summer,** Eldorado will begin construction of a new town, Uranium City near Beaver Lodge Lake. Uranium City will be the residential center of this new uranium-producing area, and is scheduled to have a population of 5,000 by 1948.

**Eldorado,** which purchases all uranium produced in Canada, has a revised purchase schedule calling for up to $14 per lb. of uranium oxide.

## World Mine (M) and Smelter (S) Production of Zinc, Thousands of Short Tons

| | 1943 M | 1943 S | 1944 M | 1944 S | 1945 M | 1945 S | 1946 M | 1946 S | 1947 M | 1947 S | 1948 M | 1948 S | 1949 M | 1949 S | 1950 M | 1950 S | 1951 M | 1951 S | 1952 (Est) M | 1952 (Est) S |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| United States | 744 | 942 | 719 | 869 | 614 | 765 | 575 | 728 | 638 | 802 | 630 | 788 | 593 | 815 | 618 | 848 | 679 | 886 | 700 | 930 |
| Other N. America | 566 | 261 | 526 | 220 | 625 | 237 | 457 | 239 | 423 | 231 | 433 | 252 | 470 | 264 | 501 | 258 | 566 | 269 | 670 | 300 |
| South America | 77 | 2 | 102 | 3 | 105 | 3 | 103 | 3 | 98 | 4 | 102 | 3 | 111 | 4 | 117 | 4 | 156 | 9 | 200 | 22 |
| Europe | 300 | 440 | 200 | 370 | 95 | 147 | 158 | 290 | 200 | 400 | 224 | 475 | 274 | 554 | 300 | 654 | 318 | 705 | 360 | 718 |
| Africa | 42 | 15 | 37 | 16 | 49 | 19 | 67 | 19 | 81 | 24 | 115 | 25 | 142 | 26 | 182 | 25 | 300 | 23 | 320 | 25 |
| Australia | 159 | 86 | 151 | 88 | 130 | 94 | 151 | 85 | 160 | 78 | 167 | 92 | 169 | 91 | 186 | 95 | 193 | 90 | 198 | 90 |
| Asia | 108 | 74 | 85 | 68 | 27 | 33 | 25 | 13 | 33 | 17 | 37 | 24 | 49 | 35 | 54 | 59 | 67 | 65 | 70 | 66 |
| Total | 1996 | 1820 | 1820 | 1634 | 1645 | 1298 | 1536 | 1377 | 1633 | 1556 | 1708 | 1659 | 1808 | 1789 | 1958 | 1943 | 2179 | 2047 | 2418 | 2151 |
| Plus* | | 128 | | 155 | | 144 | | 148 | | 160 | | 146 | | 103 | | 149 | | 140 | | 151 |
| Adjusted totals | 1996 | 1948 | 1820 | 1789 | 1645 | 1442 | 1536 | 1525 | 1633 | 1716 | 1708 | 1805 | 1808 | 1892 | 1958 | 2092 | 2179 | 2187 | 2418 | 2302 |

* Zinc content of zinc oxide, lithopone, zinc coatings and zinc sulphate produced from ores and concentrates.

Mine production is on a recoverable basis. In certain cases it has been necessary to take available statistics and estimate the probable recoverable content. Smelter production excludes secondary zinc wherever possible and it is believed that any inclusions are negligible. To show a proper balance, there has been added to world smelter production the estimated recoverable, zinc content of concentrates used for the production of zinc oxide, lithopone, zinc coatings and zinc sulphate. The bulk of this consumption of zinc concentrates by other than zinc smelters occurs in the United States.

## ". . . legitimate needs for zinc in the Western World can be met."

IN 1952, for the first time since 1946, world mine production of zinc will exceed the consumption of smelters and other primary ore consumers, according to Simon D. Strauss, vice president of American Smelting & Refining Co. Mr. Strauss presented the table above during a talk at the recent annual meeting of the American Zinc Institute. It's the result of a comprehensive study; we urge you to study it.

Citing facts to show that world smelter production is rising—in 1952 it will be 6% above 1951, 10% above 1950, and 25% above 1948 — Mr. Strauss said: "A few months ago, the world position in zinc was judged so critical as to require establishment of an international allocation scheme.

"In a few months, this situation has changed. It is now apparent that barring some unforeseen interruption to production, legitimate needs for zinc in the Western World can be met."

# Your Digest of Annual Reports

### Production, Profits, Developments, Trends from the Reports of Major Mining Companies

**AMERICAN ZINC, LEAD & SMELTING CO.** grossed $79.8-million for a net income of $3.4-million in 1951.

**Trend:** There was a further increase in the trend toward smelting concentrates owned by others and returning the metal to them.

| | 1950 | 1951 |
|---|---|---|
| Tons Ore Mined | 1,160,796 | 1,537,531 |
| Tons Milled | 1,172,388 | 1,568,147 |
| Tons Concentrates | 61,723 | 70,341 |
| Expenditures for Expl. & Dev. of New Properties | $234,061 | $1,032,283 |
| Total Zinc, Tons | 127,902 | 138,898 |
| Mining Capital Expenditures | $3,026 | $2,877,980 |

**Tennessee.** A fifth mine, the North Friends Station Mine, started at a rate of 500 daily tons in early 1952; production will be about 4,000 tons of concentrates this year.

A new zinc orebody, still being developed, is within reasonable shipping of Mascot. Its reserves, added to previous ones, give Mascot enough ore to run for more than 50 years (previous reserves: about 13 years); preliminary work for sinking of two shafts is being pushed to bring the property into production at 300,000 annual tons of ore by the end of 1953. The Mascot mill is being enlarged to 1,500,000 tons per year—for production of 75,000 annual tons of concentrates.

**Tri-State.** Newly acquired Nellie B. properties have an indicated life of five years producing 30,000 annual tons of zinc-lead concentrates. At the Quick Seven mine, 2,000 daily tons of ore will be pitted; the mill is expected to start operating by July 1, 1952, and will produce 12,000 annual tons of zinc concentrates; reserves are 1.4-million tons of ore.

**Washington State.** Grandview operated at capacity throughout the year except for one strike. Development of the Lead Hill property, 15 mi. from the Grandview mill, is showing promising results; ore thus far is primarily lead.

**Germanium.** At Fairmont City, Ill., a new unit to produce germanium is under construction, will be placed in operation in 1952. Construction of additional zinc-roasting and sulphuric-acid facilities is now in progress.

**At Dumas, Tex.,** construction of new facilities for recovering cadmium-bearing materials was scheduled to be completed by now.

**Barvue Mines Ltd.** and Golden Manitou Mines Ltd. will send their entire production of zinc concentrates to American Zinc. Barvue is scheduled to reach production in June 1952, and should reach 6,000 tons of concentrate per month in July or August.

**At Kirkwood, Ill.,** the company completed a new laboratory for research in zinc.

**AMERICAN METAL COMPANY, LTD.,** had an all-time high in net income at $10.8-million.

| Total Sales | 1950 | 1951 |
|---|---|---|
| Copper, Tons | 426,734 | 410,008 |
| Lead, Tons | 226,578 | 183,734 |
| Zinc, Tons | 167,186 | 129,742 |
| Tin, Long Tons | 10,133 | ..... |
| Silver, Oz. | 62,233,718 | 45,617,663 |

**The zinc smelter at Blackwell, Okla.,** completed a new green-ore sintering plant in November 1951; it replaces seven Ropp kilns and three smaller sintering machines.

**Southwest Potash Corp.,** wholly owned by American Metal, is expected to begin in August 1952. After a two or three month break-in, production will be at the initial rate of 185,000 tons of $K_2O$ per year.

**Mufulira Copper Mines, Ltd.,** continued construction of its new electrolytic copper refinery. The first unit will start this year and when complete, the plant will have 72,000 tons capacity.

**O'okiep** is increasing its milling capacity by 50%.

**Chibuluma Mines, Ltd.,** has proved an orebody of 7.3-million tons averaging 5.23% copper and 0.25% cobalt. Present plans are for production beginning in 1956 at a rate of 16,000

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## Digest of Reports *(Continued)*

long tons of copper and 500,000 lb. of cobalt per year.

**The DeWet Shaft** at Tsumeb Corp., Ltd., was down to 2,460 ft. at the end of 1951. It will be sunk to 4,150 ft., the limit of present hoisting facilities. In the year ending June 30, 1951, Tsumeb paid American Metals $1.7-million (on an approximate 30.5% interest).

**BUNKER HILL and SULLIVAN MINING and CONCENTRATING CO.** made a net profit of $3.7-million, down from $4.2-million in 1950.

**Bunker Hill Smelter Output**

| | 1950 | 1951 |
|---|---|---|
| Lead, tons ..... | 75,249 | 54,315 |
| Zinc, tons ..... | 14,950 | 13,372 |
| Antimony, tons .. | 1,151 | 723 |
| Copper, tons .... | 1,398 | 1,174 |
| Cadmium, lb. ... | 174,428 | 149,546 |
| Silver, oz. .... | 11,949,907 | 10,147,635 |
| Gold, oz. ..... | 3,668 | 3,283 |

**Bunker Hill Mine production** (ore, tailings, and lessee's production) was 25,476 tons of lead, 11,164 tons of zinc, and 1.8-million oz. of silver. At year's end, fully developed mine reserves were 2.5-million tons of Bunker Hill type lead-zinc-silver ore and 396,801 tons of Blue Bird type zinc-lead-silver ore; in addition, presently explored blocks in the Guy Caving area amounted to 2.0-million tons of low-grade ore.

Construction of the new crushing and fine-grinding plant is nearing completion. Vacuum de-zincing of the lead refinery and a 50,000-cfm automatic baghouse will start in 1952.

**Sullivan Mining Co.** (50% owned by Bunker Hill & Sullivan) produced 54,467.8 tons of high-grade slab zinc, 271.9 tons of cadmium, and other metals. A plant to produce 250 daily tons of sulphuric acid is on the drawing board.

**Pend Oreille Mines & Metals Co.** (15.28% owned by Sullivan Mining Co.) is operating its first 800-ton milling unit on a capacity basis, expects to complete the second about mid-1952, and the third shortly thereafter. Equipment for trackless mining will be installed soon in the east-side incline area.

**CLIMAX MOLYBDENUM CO.'S** earnings dropped from $13-million in 1950 to $8.0-million in 1951. The drop came largely through expenditures on Climax's $12.5-million expansion.

**Mine production** was up to 4.6-million tons, containing a post-war record of 22.5-million lb. of molybdenum. The company also produced about 259,000 lb. of tungsten concentrate, up from 162,000 in 1950. The tungsten and by-product treatment section of the mill was expanded so that all tailing from 20,000 daily tons of ore can be handled. Also included in the list of recovered products are pyrite, tin concentrate, monazite and topaz.

**Mill expansion** from 15,000 to 20,000 tons per day is "well under way," and should be substantially completed in 1952. Major elements are a new gyratory crusher (one of the largest ever built), a 4,700-ft. covered conveyor system, a 4-mi. 26-in.-dia. pipe line, and the byproduct plant. Also included is development from the Storke level for 1,000 tons of broken ore for each ton-per day of production; the 5,000-ton-per-day boost thus means an additional 5-million tons of broken ore.

**CONSOLIDATED MINING & SMELTING COMPANY OF CANADA, LTD.**, made a net profit of $50.8-million, $49.0-million of which came from its mining, milling, smelting and sale of products.

**Sullivan mine** produced 2.5-million tons of ore, down from 2.7-million in 1950. Grade was slightly lower. Belt conveyors were extended to the 2,850 level, where a coarse crushing plant was completed in mid-1951.

**In terms of metal output**, lead was down slightly, zinc was up, and silver was at a new record:

| | 1950 | 1951 |
|---|---|---|
| Lead, Tons ..... | 170,364 | 162,712 |
| Zinc, Tons ..... | 156,021 | 164,513 |
| Silver, Oz. ..... | 12,120,568 | 14,417,391 |

**Bluebell** lead-zinc mine on Kootenay Lake, B. C., was scheduled for production at 500 tons per day beginning in April, 1952. H. B. zinc-lead mine near Salmo is being prepared for 1,000 tons per day, and should come into production by the end of 1952. Both are equipped with mills.

**Exploration** of 74 properties during the year resulted in seven properties being optioned.

**Major projects** now in progress are Waneta dam and power plant, $30-million; modernization of Trail lead smelter, $12-million; phosphate fertilizer plant at Kimberley, $9-million; Trail zinc plant enlargement, $3.2-million; power transmission line, Kootenay River to Kimberley, $2.8-million; and the Bluebell and H. B. developments. Total cost comes to about $63-million.

**COPPER RANGE CO.'s** net was $1.0-million, down from $1.7-million in 1950. Its Champion mine produced 206,831 tons of ore containing an average of 9.0 lb. of copper.

**White Pine Copper Co.** received an RFC loan of $57,185,000 for development of the White Pine copper project. The loan carries 5% interest, and is repayable in 20 years. A sinking fund, to be started July 1, 1956 or 18 months after completion of the White Pine Project, calls for $3-million per year installments. During the year, 2,788 tons of representative ore was mined and sent to the pilot mill for testing purposes. The pilot mill operated on a three-shift basis throughout the

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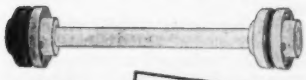

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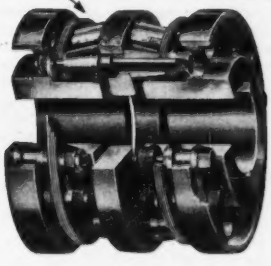

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year. Scope of the entire Project has been described in a comprehensive Manual of Procedure which calls for production beginning about the middle of 1954 and full production by the end of 1954.

**CRUCIBLE STEEL COMPANY OF AMERICA** reports that its Special Products Division, which produces high-alloy cast metals, Alnico magnets and cast-steel specialties, established new annual records.

**Snyder Mining Co.** has completed agreements under which it will operate its Whiteside mine in conjunction with an adjacent property. Stripping is on contract. Equipment—shovels, trucks, conveyors, etc.—are ordered. The Whiteside is scheduled for production in the summer of 1952, and will be capable of producing a "very large annual tonnage."

Crucible increased its interest in Rem-Cru Titanium by $850,000 in 1951.

**DOME MINES LTD.** made a net profit of $1.6-million. Gold production was up to 165,747 oz. from 1950's 159,904. Ore treated in the mill was 688,000 tons averaging 0.2409 oz. Total operating cost was $7.19 per ton.

**Mindamar Metals Corp. Ltd.**, operating a zinc-copper-silver-gold property in Nova Scotia, was scheduled to begin operations at 500 tons daily.

**Sigma Mines (Quebec) Ltd.** produced 420,154 tons of ore containing 0.1777 oz. gold per ton. Mining cost was $2.86 per ton. Milling cost was $1.01 per ton. And total operating cost (include Mint handling charges) was $5.092 per ton compared with $4.764 for the previous year.

**Campbell Red Lake Mines Ltd.** milled 173,143 tons for a total of 69,563 oz. of gold. Total operating cost was $6.983 per ton of ore milled, mined, and marketed.

**ELECTROLYTIC ZINC COMPANY OF AUSTRALIA LTD.**, for the year ending June 30, 1951, reports that the Risdon Works produced 77,529 tons of zinc, 211 tons of cadmium, and 50,765 tons of superphosphate. West Coast Mines treated 159,429 tons of ore and produced from it 46,153 tons of zinc concentrate, 10,084 tons of lead concentrate, and 3,781 tons of copper concentrate.

At the Risdon Works, plant capacity is now equivalent to about 100,000 tons of zinc per year. Work on the second unit of the contact acid plant, residue-treatment plant and ammonia-sulphate factory is progressing.

West Coast Mines now has ore reserves (established by drilling) of 2-million tons, enough to justify the 250,000-ton capacity which the mill will have when expansion is completed.

**HUDSON BAY MINING AND SMELTING CO., LTD.** made a net profit of $17.7-million after taxes and depletion.

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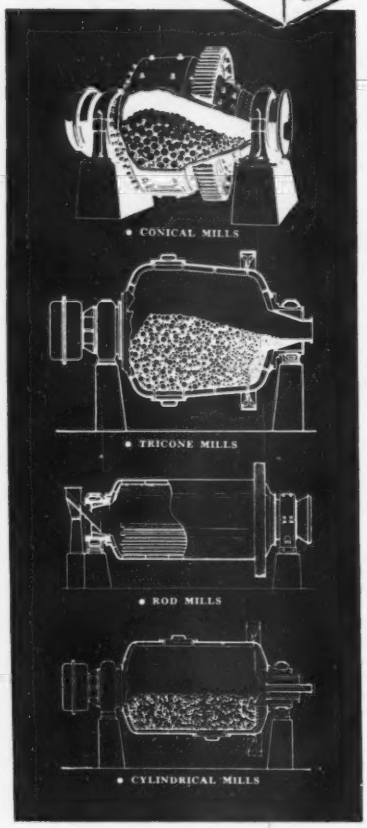


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**CYLINDRICAL MILLS**
—The Cylindrical Ball (or Pebble) Mills have demountable trunnions, and convex heads to reduce head liner wear and increase mixing action. Supplied with or without grates, as required. Bulletin AH-389-1.

*See Opposite Page for Addresses of District Offices*

HARDINGE

## Digest of Reports *(Continued)*

Ore production was 1,820,805 tons with an average assay of 2.40% copper, 4.9% zinc, 0.091 oz. gold, and 1.36 oz. silver.

Copper concentrate from this ore was 363,531 tons averaging 11.278% copper, 0.349 oz. gold, and 5.003 oz. silver.

Zinc concentrate from the ore was 137,963 tons averaging 45.5% zinc, 0.53% copper, 0.040 oz. gold, and 1.43 oz. silver.

A new zinc-fuming plant started operating continuously in November, 1951. It treated 173,890 tons of 5.2% slag, and recovered 11,104 tons of 67.3% fume which went to the zinc plant for recovery as slab zinc.

**INSPIRATION CONSOLIDATED COPPER CO.** made a net profit of $4.3-million in 1951, up from $4.0-million in 1950.

The company produced a net of 78,249,439 lb. of copper, of which 69,955,503 came from ores and the balance from leaching-in-place.

Proven reserves at the end of 1951 were equivalent to 774-million lb. of copper.

Ores came about equally from pits and underground. Live Oak and Colorado pits produced 2.0-million tons averaging 1.067% copper (0.802% of which was oxide); and underground operations produced 2.0-million tons of 0.973% ore (0.718% of which was sulphide).

A **third pit area** is being developed near the Colorado pit. The two (new plus Colorado) will be known as the Thornton Pit. A considerable part of ore from this Thornton Pit will be transferred to ore passes from which it will be hauled to the Inspiration Main Shafts for hoisting. "The open-pit method . . . makes possible a greater degree of selective control over the ore to be treated and it also permits the mining of certain areas from which the ore could not be extracted economically by any other method. Although no new orebody is involved, this latter factor increases the reserves of mineable ore."

**JONES & LAUGHLIN STEEL CORP.** increased its ingot capacity by 13%, from 4.85-million tons on Jan. 1 to 5.5-million on Dec. 31. At Benson Mines in upper New York State, new concentrating equipment to process non-magnetic ore went into operation in Jan., 1952; it will increase concentrate production by 30% or 300,000 gross tons annually. To prepare these concentrates for its blast furnaces, the company is adding another sintering plant that is scheduled for operation in June, 1952.

**Tracy mine** in Michigan (underground) is scheduled for first production in 1954, and is expected to produce 1-million tons a year by 1962.

A **future project** is addition of ore

handling and treatment facilities at the Hill Annex mine, Minnesota.

**U. S. STEEL CORP.** produced 57.3-million tons of iron ore in 1951, up from 46.2-million in 1950. The company sold about 10-million of those tons to other users.

**In taconite,** Oliver Iron Mining Div. finished construction at Virginia, Minn., of the first pilot combination sintering and nodulizing plant. It has an annual capacity of 500,000 tons of beneficiated ore. Construction of the corresponding plant for beneficiation of taconite was started in 1951.

**Orinoco Mining Co.** completed the engineering phases of its plans for Cerro Bolivar. It is expected that shipments of ore will begin in 1954.

**Study and exploration** of new sources of manganese ore were continued on an active basis during the year.

**VANADIUM CORPORATION OF AMERICA** hit a new high in net sales at $35.9-million, for a net income of $2.0-million (down slightly from 1950).

**Chromium ore** production from the corporation's properties in Southern Rhodesia was up 34% from 1950.

**Production** of the western division was stepped up by a substantial enlargement of the mill at Durango, Colo.; it was completed in Oct. 1951.

**At Marysvale, Utah,** exploration disclosed further extension of mineable high-grade uranium ore, with additional showings of pitchblende. An option has been taken on a site for a mill.

**Sales of VCA's** boron-containing Grainal alloys was up six times over 1950, but was still relatively small. Grainal alloys are multiple-element ferro-alloys containing iron, vanadium, titanium, aluminum, boron, zirconium and manganese.

**In November,** VCA leased Hetzer Mines, Inc.'s tungsten mill at Nederland, Colo., and is now processing its own and custom tungsten ores.

**WAITE AMULET MINES, LTD.,** made a net profit of $5.3-million from its operations near Noranda, Quebec. The milling of 387,754 tons of ore produced concentrates containing 25.6-million lb. of copper, 28.6-million lb. of zinc, 9,620 oz. of gold, 346,150 oz. of silver, and 45,603 long tons of pyrite.

Reserves at "C" shaft were nearly exhausted: Only 9,800 tons of ore remained.

Reserves at East Waite were 1.0-million tons of 4.1% copper, 3.15% zinc, 0.048 oz. gold, and 0.88 oz. of silver.

Amulet Dufault reserves were at 931,000 tons, mainly in the Lower "A" Orebody where 696,000 tons contained an average of 5.7% copper, 4.05% zinc, 0.045 oz. gold and 1.5 oz. silver.


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**CLASS XH**
—For direct heat drying at temperatures above 212°. A single shell parallel flow dryer designed to handle sticky materials.

**CLASS XW**
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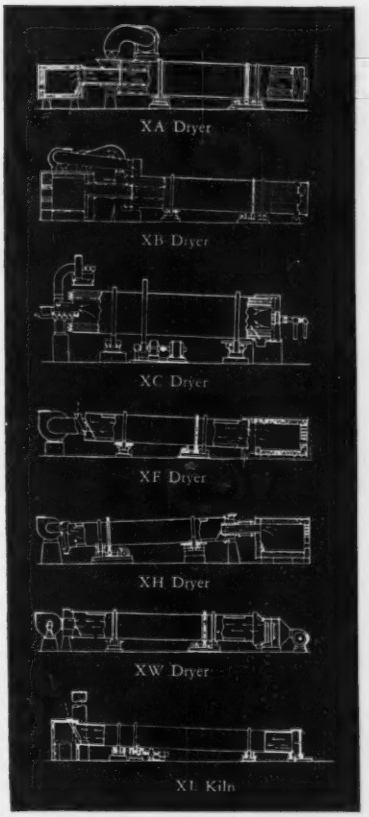
Bulletin 16-D-1 describes entire Ruggles-Coles line.

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# IN THE UNITED STATES

## ALASKA

★**Red Mountain Mining Co.** will drill its platinum property on McCann Creek near the operations of Goodnews Bay Mining Co., according to Lawrence Bissell, president. A small crew will also be at work on the company's 29 claims in the area.

★**Zenda Mining Co.** plans to install a tin mining dredge this season at its property at Tin City. Norman Stines will be in charge. In April the company took approximately 10 tons of supplies from Teller to Tin City on two sleds constructed especially for the trip. The round trip required about two weeks.

★**Use of an automatic** hydraulicking device has been described in a recent article by John Miscovich, a mining operator in the Poorman district. He told of removing 173,760 cu. yd. of frozen muck at the property last season (60 days' sluicing time) with the "Intelligiants." Labor cost was $700, or 4¢ per cu. yd. compared to 10¢ per cu. yd. in 1947, when stripping was done with manually directed giants.

★**The Department of Civil Engineering** and the School of Mines at the University of Alaska have completed their first research project with the publication of a 22 by 34 in. map showing location of mining recording districts and areas closed to prospecting in Alaska as of Feb. 1, 1952. It has been superimposed on the U. S. Geological Survey map A. Information was collected by Ernest Wolff, research associate of the School of Mines and the map was prepared by Mrs. Claude Matthews, assistant.

★**George Sundborg,** general manager of the Alaska Development Board, says that cost of power from the Taiya Valley project near Skagway is about 2 mills per kwh—roughly half the cost to many aluminum producers in the United States. The $500-million project, now being planned, is attracting the attention of aluminum producers. In 1952, Alaska will also see its first lode tin mine in operation.

★ **A report from Juneau** states that a road into the Nizina district of the Copper River Region is advocated by James A. Williams, associate mining engineer of Kennecott Copper Corp. It is believed that an area of about 500 sq. mi. has about the same geology as the area from which Kennecott produced $225-million worth of copper from three deposits during the period from 1911 to 1938.

## ARIZONA

★**Yucca Mining and Milling Co., Inc.,** has signed an agreement with DMPA which provides for a government-guaranteed price of 34.355¢ per lb. for approximately 1,735,000 annual lb. of copper produced by the Antler mine at Yucca. The price is f.o.b. the El Paso refinery, and compares to the present ceiling there of 24.075¢ per lb.

★**San Manuel Copper Corp.,** wholly-owned subsidiary of Magma Copper Co., has applied to RFC for a $111,288,000 loan to finance its copper mining project in Pinal County, 45 mi. north of Tucson between Oracle and Mammoth. If the loan is approved, it will be the largest single business loan ever made by the government.

**Project** calls for facilities for milling 30,000 tons of ore and for smelting 800 tons of concentrates daily, power and water facilities, a railroad line, and development of a town site about the size of Prescott.

Magma General Manager Wesley Goss said final approval of the loan must await lengthy negotiations and he could not foresee production of ore at the San Manuel property in less than four years. At the same time, however, RFC Administrator Harry A. McDonald said that within four years after construction is started, the project is expected to produce about 140-

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million lb. of copper and 6-million lb. of molybdenite annually.

## CALIFORNIA

★**Mt. Diablo Quicksilver Co., Ltd.,** has begun operation of the Mt. Diablo mercury property at Clayton, Contra Costa County. Property includes the Ryne mine, which was first worked in 1875. Equipment includes a rotary furnace capable of treating 40 tons of cinnabar daily, and the new operator expects to increase capacity of the plant to 100 tons of ore a day.

★**A sulphur deposit** at Canary Hill mine, Chalk Mountain in Lake County, is currently being developed under lease to the Chemi-Cal Sales Corp., Beverly Hills. Sulphur occurs in fissures in andesite and as cement in the overlying debris; it was deposited as a result of oxidation of hydrogen sulphide contained in gases rising along fractures in the andesite.

★**In Barstow,** the Lighthouse Mining Corp. plans to buy scheelite-bearing ores or mill such ores on a custom basis. Price charged for custom milling is open depending upon the character of the ore; concentrates derived will be returned to the producer. Producers may also sell scheelite ores outright to the mill for $36 per short ton (dry weight) unit of contained tungsten trioxide. Mill is in the Mojave River bed in Barstow, and consists of primary and secondary jaw crushers, screens, ball mill, cone classifiers, and tables. It has a capacity of 80 tons per 24 hours.

★**Castle Crags Chrome Co.** has recently taken over the chromite milling plant at Castella, Shasta County, which was operated during World War II. Company officials have announced that they are now ready to buy low-grade chrome ore.

★**Minona Mining Co.** has acquired gold placers covering 1,300 acres extending more than 1,600 ft. on historic North Bloomfield Channel between Birchville and French Corral about 14 mi. west of Nevada City. In that area numerous hydraulic mines produced fabulous amounts of gold between 1850 and 1884 when operations were halted by antidebris legislation.

Minona operates a dragline dredge and washing plant handling 2,000 cu. yd. of gravel daily near the old Esperance hydraulic workings at French Corral and will increase production to 4,000 cu yd.

## COLORADO

★**Canyon Gold, Inc.,** has drifted on its newly found vein on the 11th level for more than 50 ft., according to Troy Wade, president. The first 25 ft. sampled between 3 and 5 oz., but the last few rounds are running 0.8 to 1.0 oz. It varies from 8 to 18-in. in width, and specimens continue to show free gold.

★**Newmont Exploration, Ltd.,** operating in the Westcliffe district, is using core drills capable of testing to a depth of 2,500 ft. Deepest workings at present are in the Geyser shaft, which when it bottomed at the 2,650 level, was the deepest in the world. The Bassick shaft bottoms at 1,850 ft., and the Bull-Domingo at 1,020. Newmont Exploration, working on a round-the-clock basis, has two drills going and is drilling to depths of around 700 or 800 ft.

★**Sometime in the summer of 1952,** the Sts. John mine at Montezuma may be the biggest producer in Summit County. Buck Oelrich, who reopened the mine and has operated it for the past several years, has exposed ore for 400 ft. on the main tunnel level. He has done some stoping to 400 ft. above the tunnel. Now he's getting ready to sink a 100-ft. winze, and when completed will have a big block of ground ready for stoping.

★**Colorado Western Land Co.** has embarked on an expansion program. The company has moved its principal office from Glenwood Springs to Salida, and has employed J. E. Carruthers of Elko, Nev., as chief engineer and geologist. Gordon M. Chambers, president, also announces that the company is negotiating with a view to erecting a mill

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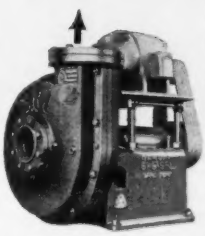

***Examples of DENVER SRL Rubber Lined Pump Curves****

***Here's Why...***
Power cost is 30% to 70% *less* than for other sand pumps on similar service. *REASON:* greater hydraulic efficiency resulting from simple design, rubber parts and lighter weight. Accuracy of rubber parts results in 1½ to 3 times greater efficiency than other sand pumps.

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If you pump ¼" abrasives, describe your pumping requirements. Let us study and report specific advantages of Denver SRL Pumps over pumps you now use. Write Today!

| Size | Gals. of water per minute | | 20' head | 40' head | 60' head | 80' head | 100' head |
|---|---|---|---|---|---|---|---|
| 2"x2" SRL | 50 | RPM | 838 | 1090 | 1320 | 1525 | |
| | | HP | .60 | 1.5 | 2.8 | 3.2 | |
| 3"x3" SRL | 100 | RPM | 760 | 1033 | 1303 | 1453 | |
| | | HP | 1.1 | 1.9 | 3.4 | 4.3 | |
| 5"x5" SRL | 300 | RPM | 590 | 800 | 956 | 1087 | |
| | | HP | 2.4 | 5.4 | 8.3 | 11.5 | |
| 6"x6" SRL | 1000 | RPM | | 862 | 1005 | 1122 | |
| | | HP | | 14.4 | 22.6 | 30.0 | |
| 3"x3" SRL-C | 150 | RPM | 870 | 1145 | 1385 | 1580 | 1745 |
| | | HP | 1.5 | 3.2 | 5.3 | 7.2 | 9.6 |
| 5"x4" SRL-C | 350 | RPM | 655 | 850 | 1020 | 1160 | 1280 |
| | | HP | 2.9 | 5.4 | 8.3 | 11.4 | 14.5 |
| 8"x6" SRL-C | 800 | RPM | 500 | 655 | 780 | 890 | 980 |
| | | HP | 5.7 | 11.6 | 16.8 | 22.3 | 28.6 |
| 10"x8" SRL-C | 2000 | RPM | 485 | 610 | 710 | 800 | 855 |
| | | HP | 14.0 | 27.8 | 41.2 | 56.3 | 71.6 |

(*Multiply these horsepower ratings by the specific gravity of your pulp to determine actual brake horsepower required.)

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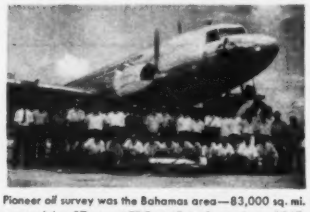
# Flying Magnetometer Pays Off

*in oil and mining explorations*

Newest geophysical tool is the airborne magnetometer which Aero Service put to work for oil and mining industries 5 years ago.

The first mineral surveys ever made were flown in Ontario in January, 1947, at temperatures as low as 40 below. Important data was obtained. Our affiliate is CANADIAN AERO, Ottawa.

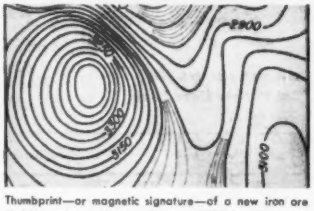


Pioneer *oil* survey was the Bahamas area—83,000 sq. mi. mapped by 37-man AERO staff in 9 months in 1947. Sharan guided the plane here and in oil and mineral surveys in South America.

Lake-based surveys turned up valuable mineral data in Canada. AERO had a part in the great Allard Lake ilmenite find in 1948.

In Portuguese East Africa, the oil search was advanced many years through a 24,000-mile reconnaissance with the airborne magnetometer in 1948-49.

AERO'S DC-3 takes off from a Liberian airfield, where AERO crews are at work on an extensive mapping-magnetometer survey project. That's an ant hill in the foreground.




Thumbprint—or magnetic signature—of a new iron ore find located recently at a depth of 1500 feet in eastern Pennsylvania, in an area missed for years by ground survey parties.

AERO, who pioneered the first aeromagnetic survey five years ago, can bring over 400,000 miles of worldwide exploration experience to your conference table.

**AERO SERVICE CORPORATION**

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## Colorado *(Continued)*

at the company's property. The mill would be a new type for separating pegmatite-dike ores which are numerous in the area. It would use a new process recommended by USBM in conjunction with Colorado School of Mines. Arrangements for equipment are being worked out with an engineering company in Jacksonville, Fla.

★**Charles Carlton** reports that the average of February shipments from the Ajax mine at Cripple Creek was $60 per ton. Several lots ran as high as $140 in gold. During March a shipment settled for 5.685 oz., or $198.97 per ton.

★**U. S. Lead Corp.** is making good progress at the Superior mine at Montezuma. It's under the supervision of Hugh Chisholm, and the company has employed K. S. Herness, professor of mining geology at Golden, as consulting geologist. Herness says that the district is one of the last relatively unmapped ore intersections in Colorado, and adds that he feels a complete mapping will turn up new orebodies of considerable economic importance.

★**Golden Cycle** began to swing into high gear last year. The mill treated 112,378 tons worth $1,253,729 in 1951. Severe labor shortages hampered operations of the Ajax mine, and the company foresees a continuance of that shortage.

★**Bachelor Corp.** plans to complete its new uranium concentrator at Placerville on about June 15, 1952. The mill was designed to handle uraninite-pitchblende ores from the company's Black King and White Spar mines in San Miguel County—near the concentrator. Some doubt over identification of the uranium minerals comes from the difficulty of identifying them in the asphaltite in which they occur. Robert I. Ludwig, newly elected vice president in charge of mining, milling and refining, says that an exploration program is now under way. It will determine eventual size of the operation.

## IDAHO

★**Sun Valley Lead-Silver Mines** has resumed development of the Blue Kitten mine, near Sun Valley. Heavy snows forced suspension of operation in January. But with new roads, new equipment and preparations, the mine is expected to be ready for year-round operation, according to Ross Roundy, president of the company.

★**Snake River Miners & Prospectors** Association, a newly organized group, wants the government to construct an ore-buying depot and custom mill at Weiser, Idaho. In his last annual report, George McDowell, state mine inspector, has the following to say about the Weiser district:

"The district at one time had two

# QUAKER *Production-eered** BELTING

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Through the years, this faithful QUAKER belt has harnessed the horsepower of this big main drive . . . delivering smooth, silent, positive power. And still no signs of wear or tear! Says the production superintendent: "We find Quaker belting holds up twice as long as any other belting. We are now using a belt that's as good as the day we put it on . . ."

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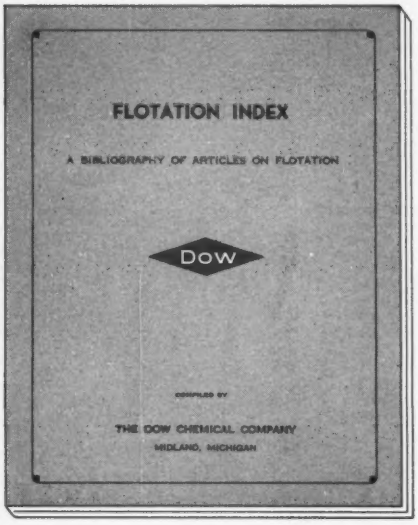
# ANNOUNCING




## 22nd annual additions to the FLOTATION INDEX

To maintain the most complete authoritative guide to published material on the flotation process . . . request our twenty-second annual supplement for your FLOTATION INDEX. Many of the listings and descriptions of books and articles in the 1952 compilation are of particular note.

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## Idaho (*Continued*)

blast furnaces in operation and was a large producer of silver. It has been dormant for years, however, and has almost reverted to its primitive condition. Nearly all the ores are high-grade silver-copper ores, rather complex, but could be handled by modern flotation methods."

★**Idaho Consolidated Mines, Inc.** is scheduled to have resumed production by now at its copper mine 30 mi. south of Salmon. The mine has been shut down while damages of a recent fire were repaired. New equipment—some of it additional—is due to arrive soon: a 315 cfm compressor, gyratory crusher, and air trammer. The property is equipped with a 50-ton mill.

★**Nat T. Davis,** president of Silver Star-Queens Mines, Inc. reports that work on the DMEA exploration program is going ahead rapidly. Operations at the mine, in Mineral County, are being pushed on a two-shift basis with about 18 men employed. A drift on the Queen of the Hills vein is in about 700 ft. and more than $20,000 worth of good mill grade lead-silver-zinc ore has been stockpiled.

★**"Sand Bonanzas"** are now taking the place of "gold bonanzas" of pioneer days in Idaho and, strange to relate, the "sand bonanzas" are in the same place and the same sand as were the "gold bonanzas." The monazite sands, considered a "nuisance" by the old placer miners, make a project more valuable than it originally was for gold. Three companies are now operating dredges near Cascade, Idaho, in the mile-high Warren Valley. Idaho geologists estimate reserves at 200-million yd. of monazite sand in Idaho placer deposits. The Warren Valley alone is estimated to contain 40-million cu. yd. of monazite gravel to a depth of 35 ft. Monazite contains 4 to 5½% thorium.

## MICHIGAN

★**Ore shipping** from Escanaba began on April 2 this season when the freighter Alfred Heekin took the first boat load of ore which had come from the Iron River-Crystal Falls district. This was one day later than the first cargo in 1951. Loading at the mines of the Iron River area began on March 21.

★**About 150** Cleveland Cliffs Iron Co. employees received first aid training from the U. S. Bureau of Mines during April. The course was conducted by Reino O. Pyannonen, mining engineer, from the Bureau's Duluth district office.

★**Gogebic County mines** had but one fatal accident during 1951, as shown by the annual report of Theodore Nyman, county mine inspector. This was the best record for the 63 years of mining in the county. The 2,967,-


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The VICTAULIC METHOD is a *complete* line of Victaulic Couplings, Full-Flow Fittings and Vic-Groover Tools for mechanical piping construction. It's the easy way to hook-up pipe . . . it's fast and versatile . . . it's *complete and all-inclusive!* Use the VICTAULIC METHOD and you streamline piping . . . cut costs!

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STORAGE BATTERIES

## Michigan *(Continued)*

718 tons mined during the year was the lowest since 1945. In only 16 of the years since production records were begun in 1888, has a yearly figure been lower.

★**A total** of 135,154 tons of iron ore was all-rail shipped from the Iron River district in 1951. The Spies mine of the Cleveland Cliffs Iron Co. and the Wauseca-Aronson of M. A. Hanna Co. forwarded all but 531 tons of the total.

★**A law** which postpones full taxation until a property enters into the merchantable output stage of production —up to 10 years—has stimulated exploration work on Michigan iron ranges. A second law, which has passed the house but not the state senate, aims to clear titles to mineral rights. It would require owners of mineral rights to re-register them at five-year intervals under penalty of forfeiture. Because second and third generation owners of mineral rights are now scattered far and wide, the ownership of rights on some properties is difficult to untangle.

★**Mine valuations** in both iron and copper districts are higher in 1952 than in 1951. Recommended 1952 valuations from Dickinson, Gogebic, Iron and Marquette Counties, which contain the iron ranges, are $79,010,000 against $68,866,000 for 1951. In the copper counties of Keweenaw and Houghton, recommended valuations for 1952 are $4,278,000 compared to $4,132,000 last year.

★**The 1951 report** of mine inspector, Richard Johns, for Marquette County shows total shipments for the year of 6,042,990 tons. Men employed underground were 2,575 out of the 3,691 employed in mining. The Mather mine output of 1,757,683 tons (1,555,766 tons by the Great Lakes and 201,917 all-rail) is an all-time Marquette Range record. The mine is expected to attain an ultimate production of 3-million tons per year.

★**A strike** on the 100-mi.-long Copper Range Railroad which began on March 7, has tied up the Caledonia copper mine in Ontonagon County, the Champion shaft near Painesdale in Houghton County, several wood products firms, and the Atlas Powder plant near Point Mills. About 40 maintenance workers are demanding an increase of 23½¢ an hour and another 85 engineers, switchmen, etc., refuse to go through the picket lines.

★**Late in April,** Calumet & Hecla Consolidated and Local 4312 of Steelworkers of America were extending their labor contract on a day-to-day basis. The Union was asking a 17½¢ an hour raise plus certain benefits enjoyed by the iron-ore workers. A company offer of 15¢ an hour, conditioned on the company receiving a 4¢ subsidy on all primary copper, was rejected by the union. The union

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### S11ST Offset Telescopic Leg Stoper

# *It's Fast!*

**...and sized right**

3 Sizes – 28" - 40" - 52" Feeds

# *It's Tough!*

Built *right* by the leading manufacturer of offset and roof-bolting stopers!

S11ST Stoper length range from 23" closed to 86½" open.

**Only Le Roi-CLEVELAND S11ST gives you all these features for dependable, low-cost drilling**

★ Convenient right-hand feed control provides the right feeding pressure for fast drilling in any rock.

★ Trip rotation release allows piston to strike straight, hammer-like blows.

★ Feed leg supported at backhead and chuck housing for extra strength.

★ Fewer packings to replace in air-feed leg means less trouble, easiest servicing.

★ Button in handle provides fast, positive feed release, for quicker, easier steel changing.

★ Constant blowing around front end prevents slush and cuttings from entering drill at front end and greatly reduces wear.

★ Water tube can be removed quickly —you don't have to dismantle the machine, just take off the backhead plug.

★ Shielded safety handle protects operator's hands.

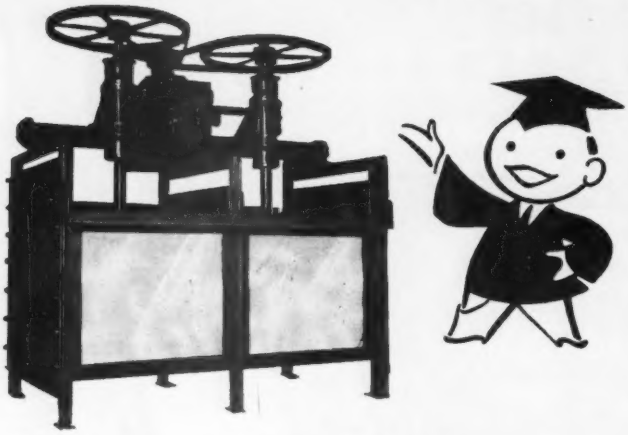
★ Air consumption is low.

Standard Le Roi-CLEVELAND S11 Offset Stopers can be converted to this new telescopic type.

So get set for faster drilling and lower costs — standardize on these new stopers. Write for complete details.

LE ROI (LR) **LE ROI COMPANY**

# AGITAIR



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### Michigan *(Continued)*

wanted the Stabilization Board to determine the wage and other benefits first, and then to have appropriate federal agencies (DMPA) grant an adequate allowance in subsidies if needed. [DMPA and Calumet & Hecla have already negotiated an over-ceiling price covering production from four high-cost mines on the Peninsula.]

## MINNESOTA

★**Ben Kangas,** St. Louis County mine inspector, reports eight fatal accidents in the county's iron mines this year. That's a rate of 0.663 per 1,000 men. Three were at underground mines, where about 1-million tons were produced per fatal accident. Five were at open-pit operations, where the ratio was one fatal accident for each 11.4-million tons of ore. Of the 231 mines in the county, the 116 active ones shipped a total of 60.2-million tons of ore—3-million from underground and 57-million from pits.

★**Operations** in the Kinney area got off to an early start: W. S. Moore Co. started work at its Margaret mine early in April. Cleveland-Cliffs resumed work at the Wanless. Snyder started producing from its Whiteside mine again.

★**Steelmaking capacity** increased by 4-million tons in 1951, but the geographical center of activity moved southwest only 10 mi.—to Beaverdam in Allen County, Ohio. American Iron & Steel Institute also reported that 17 of the 27 steel-producing states added to their capacity in 1951. Ohio and Pennsylvania led the way with about 800,000 tons each.

★**On Saturday, April 5,** Mrs. Alex D. Chisholm broke a rechristening bottle of champagne on the bow of Interlake Steamship Co.'s Alex D. Chisholm. The 10,000-ton ore boat was formerly known as the Elton Hoyt, 2nd, but was renamed in honor of the Pickands, Mather & Co. partner because a new freighter now being built at Sparrows Point, Md., is called the Elton Hoyt, 2nd.

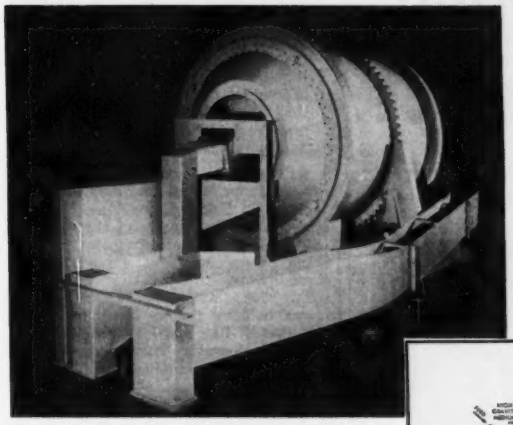
★**Recent DPA certificates** of necessity cover $2.9-million of the $4.6-million which Pickands, Mather & Co. and Butler Brothers Co. (now operated by the M. A. Hanna Co.) will spend for mining equipment, stripping and mine development at Cooley and Coleraine.

★**The Tom Girdler** was damaged on April 25, when she struck ice in Whitefish Bay. The damage was in her bow, but a diver was unable to determine the extent when she was held up in the Sault. She proceeded on to Cleveland on her second trip of the season.

★**Iron ore production** in the United States reached a record 130-million

# HIGHER CONCENTRATE GRADES

## ...lower tailings



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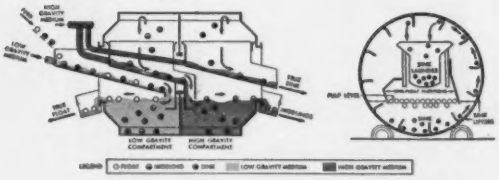
*is the only Heavy-Media Separator producing* ***three*** *products by* ***absolute**** *gravity control*

Ores amenable to HMS and containing middlings are now successfully treated to produce an **optimum grade concentrate, lower tailings,** and an **accurately segregated middling** that can be reprocessed for maximum metallurgical extraction.

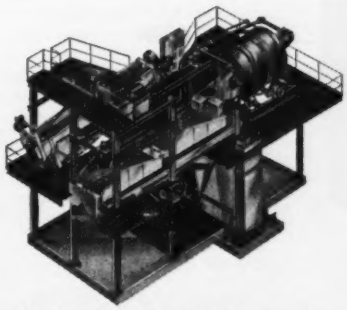
### LOW CAPITAL INVESTMENT AND OPERATING COSTS

The superior metallurgical results of a two stage process are accomplished in **one** drum and **one** media reclamation circuit. There is no unnecessary duplication. Cost is a minimum.



### A POSITIVE OPERATING PRINCIPLE

- True float is separated by a low gravity media in 1st compartment, while sink passes to 2nd compartment.
- True sink and middlings are separated by a high gravity media in 2nd compartment.
- Both high and low gravity media remain uniform and constant in density in their respective drum compartments.
- Overflow of float material and lifting of sink are simple, effective actions.
- The entire separation is accomplished within one unit.



### AVAILABLE IN MOBIL-MILLS

**For ores having middlings,** Wemco Double Drum Separators are furnished as the separatory vessels with Wemco Mobil-Mills—the prefabricated HMS plants used by the majority of Heavy-Media operators throughout the world.

**Ores requiring less complex treatment** are beneficiated in Mobil-Mills using popular single compartment Wemco Drum Separators or the efficient Wemco Cone Separator, depending on the nature of the separation involved.

★ Absolute gravity control provides **positive** separation of the middling by the use of a homogeneous medium. This prevents the lower grades and recoveries common with the partly heterogeneous actions of other types of separating units.

***Write today** for information on your problem. Mobil-Mills are available in various sizes to treat up to 350 t.p.h.*

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Its light weight makes Naylor Pipe easier to handle and install. Its exclusive structure makes it stronger and extra safe in the rugged service required for tailings lines and other mining applications. Along with these advantages, Naylor provides the one-piece Wedge-Lock Coupling that speeds connections and simplifies installation of the line. No wonder scenes like this are so familiar throughout the industry.

*Write for Bulletin No. 507*

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### Minnesota *(Continued)*

tons in 1951. Imports also reached a new high of 11.4-million tons; largest importers were Chile, Sweden, Canada and Brazil. Canada in turn, receiving more than three-fourths of our 4.8-million-ton export, was a net importer; that condition is due for reversal this year or in 1953, as Canada's production increases as per plan.

★**Pittsburgh Steamship Co.'s** A. H. Ferbert pulled out of Two Harbors docks on Friday, April 4, about 6:30 with the first ore from the head of the lakes. Captain Parsons reported that there was not enough ice in Lake Superior "to rattle in a glass." Two days later, however, navigation was held up for 48 hours by ice in Whitefish Bay and loaded boats were obliged to wait. They were released on April 8, and shipping has been going at a lively rate since then.

★**At the request of** Defense Transportation Administration, deeper loading of lake vessels will be permitted this year. That should make for a record season in 1952.

★**M. A. Hanna Co.** started the year with some new heavy equipment: A 190-B 10-yd. excavator at the Mesabi Chief; a new 6½-yd. electric shovel and five new 30-ton trucks at the Carlz. Hanna continued to strip the Agnew No. 2 with a 7½-yd. shovel, using the dirt to build a new tailings basin.

★**Oliver Iron Mining Division** is shipping about 25 cars of ore per day all-rail to Birmingham, Ala. It comes mainly from the Godfrey underground mine at Hibbing.

## MONTANA

★**Montana's Governor** John W. Bonner has proclaimed Montana's Gold Centennial during the week of August 18-24, when there will be a centennial celebration in Deer Lodge, Powell County, Mont. The proclamation states that "Gold was discovered 100 years ago by Francois Finlay (Benetsee) in 1852 at Gold Creek, Mont., which is now part of Powell County.

★**Newly incorporated** for mining in Montana:

**Kootenai Mining Co., Libby.** Authorized capital, $100,000. Incorporators: Roger H. McConnel, Alfred E. Nugent, and James E. Gyde.

**Mines Prospecting and Exploration Co.** Authorized capital, $50,000. Incorporators: Earl F. Elstone, Herbert Fisher, and R. R. Wallace.

**Colmont Uranium Mines Co.** 50,000 shares of no par value. Incorporators: P. M. Mosier, R. G. Bayles, and Richard Bayles.

**Copper Canyon Mining Co.,** Hamilton. Authorized capital, $100,000. Incorporators: Lee, Zella, and Ernest Shook.

**Monia Mining Co.,** Missoula. Au-

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### automatic feed drifters

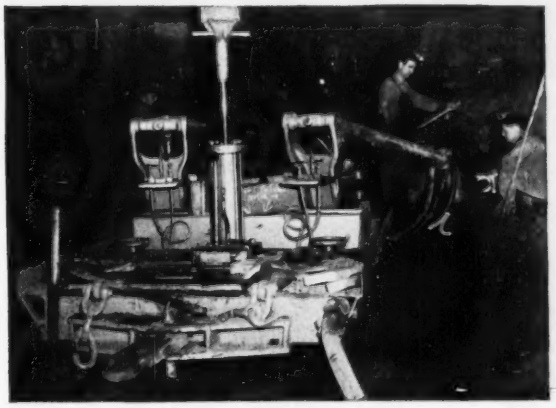
—Low vibration simplifies set-up.
—Self-adjusting feed maintains high drilling speed.
—Powerful rotation handles tight steel, saves lost holes.
—Convenient controls boost drill runner's efficiency.
—Long feed guide shells for fewer steel changes.

## *DRIVE HEADINGS FASTER with this* DOUBLE PUNCH!

## GARDNER-DENVER

### hydraulic drill jumbos

—Faster set-up—move in and start drilling.
—Long feeds—up to 10 feet—give more actual drilling time per shift.
—"Creep-free" booms — maintain steel alignment.
—Offset booms spot lifters easily.
—Faster tearing down — release hydraulic pressure and back away.
Write today for full details.



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Gardner-Denver Company, Quincy, Illinois
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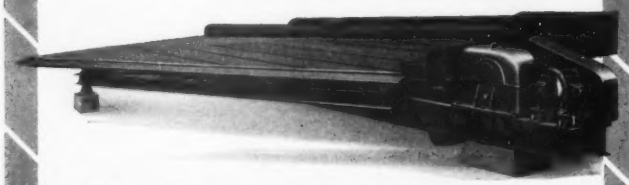
THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS

# Many "Little Things" Add Up to BIG SAVINGS

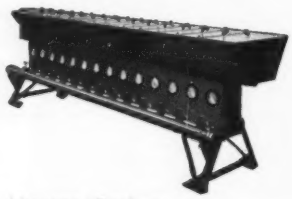


Although the basic diagonal deck design of the *SuperDuty* Concentrating Table is responsible for the major share of its recognized potential, there are many other lesser but related features that add up in the overall operating cycle to BIG savings.

The reduction of wear and tear on the re-circulating equipment, the time-proved anti-friction bearing head motion, the low current consumption, the factory-aligned underconstruction and the long-life deck covering and riffles all effect economies that add up little by little throughout the operating year to total savings that further explain why *SuperDutys* have figured in most important table installations of recent years.

For full information, write for Bulletin 118B.

**Concenco Type "CPC" Classifier**



This All-Steel Constriction Plate Classifier is available in 1 to 10 or more cells. Each cell has a pressure chamber at the bottom, a sorting column just above, and a launder section at top. Advantages offered are: (1) Sharp separation, (2) accurate classification, (3) as many spigot products as there are cells, (4) continuous discharge, (5) no moving parts, (6) low maintenance cost.

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CONCENCO PRODUCTS

★ *The ORIGINAL Deister Company* ★ *Inc. 1906*


## Montana *(Continued)*

thorized capital, $150,000. Incorporators: George Sutherland, F. E. Buck, and W. T. Boone.

★**U. S. Geological Survey** has completed a preliminary report on the uranium deposits in the Clancey District, south of Helena, in Jefferson County; the report shows nine distinct deposits. Work was done by W. A. Roberts and A. J. Gude III, geologists with the Spokane regional office. Copies of the report are not available for public distribution, but are on file for public inspection at the regional office of USGS at Spokane, the Helena public library, and the Montana Bureau of Mines and Geology at Butte.

## NEVADA

★**Underground near Searchlight,** Hugo Stange, Walter Thing, J. R. Hughes, and A. G. Cowden are developing their leased Big Casino mine. They are stockpiling lead-silver-gold ore and are also crosscutting.

★**Black Rock Desert Mineral Co.** has announced plans to spend $100,000 for new milling and refining plants at Sulphur in northern Washoe County. The increase will bring the company's output of agricultural sulphur to 400 tons daily, and its output of chemical sulphur (from another 400 daily tons of ore) to 125 tons daily. At that time, the weekly payroll will be about $4,000. The company now has one mill in operation and another under construction.

★**Ira B. Joralemon,** director of Homestake Mining Co., reports that prospects look good at the Tonopah Development Co. exploration near Tonopah. The exploration is being done jointly by Homestake and Summit King Mines, Ltd.

★**El Capitan mine** near Baggs is producing 20 daily tons of tungsten ore. Managers Gordon and Lindsay Smith report they have located another scheelite deposit a short distance from El Capitan and are now drilling it. Stan Chiatovich, superintendent, is in charge of the mine and mill.

★**Pioche Manganese Co.** (controlled by Combined Metals Reduction Co.) expects to start producing manganese from its new plant at Henderson sometime next summer.

★**Combined Metals Reduction Co.** is sinking a two-compartment shaft on Lone Mountain, 28 mi. northwest of Eureka. A lead-zinc deposit there has been churn drilled.

★**Clarence (Red) Staggs** and Angelo (Tony) Quilici have taken a five-year lease and option on Churchill County tungsten claims belonging to Cordero Mining Co. The consideration is reported to be $65,000. Staggs and Quilici say they discovered a new de-

# "Big Red" TD 24 Cleans Up in Church Hollow

**CLEAR-CUT WORKER.** Tony Mamone's TD-24 clears away the trees preparatory to cutting down the overburden of this high summit in Church Hollow.

## International's Champ of Crawlers does the job right for West Virginia mine operator

Down in Church Hollow in the Blue Ridge Mountains, a Big Red International TD-24 has stepped up Tony Mamone's production 200 tons a day and put his operation well into the profit side of the ledger.

Owner Mamone tells how his TD-24 does it:

*"With my TD-24 taking off overburden and trees where I'd not think of sending in another tractor, I've been able to save half in powder. By getting down to solid rock the shots break up better. Using my TD-24 I've been able to save buying a bigger shovel—the TD-24 brings my coal down to ordinary shovel height.*

*"In fact, my TD-24 is sent in on the very worst work. A coal stripper can't make good money these days without a TD-24."*

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**CUTTING ALONG THE HIGHWALL.** The TD-24 steers with fingertip hydraulic control, has full reverse synchromesh transmission, makes faster cycles. That's why coal production is high here.

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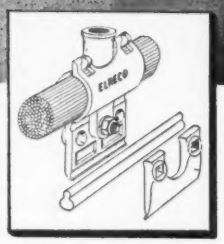


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You support feeder cable and trolley wire *independently* when you use exclusive Elreco Combination Clamps. This means that either trolley wire *or* feeder line may be installed, adjusted, repaired or removed at any time *without* disturbing the other.

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Elreco manufactures the *only complete line* of feeder and trolley wire supports. Duplex Spacer Clamps for supporting the trolley wire directly under a feeder make possible additional feeder capacity and insure an extremely flexible mounting where "headroom" permits.

The entire line is available in 5 sizes for Fig. 8, grooved or special No. 9 trolley wire, feeder cable from 0000 to 1,500,000 circular mils.

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***Serving the mining industry since 1892***

THE ELRECO CORPORATION

A COMPLETE LINE OF TROLLEY MATERIAL FOR EVERY MINE

## Nevada *(Continued)*

posit of tungsten last October, and that some of it assayed up to 2% $WO_3$.

★**Recent drilling** at Placeritos in Pershing County has shown favorable results, according to the officers of Gold & Ophir Inc. who are in charge of the project. They report profitable tin and gold ore at 6 to 18 ft. in depth. V. C. Frazier, manager for the operators, says a large amount of pay gravel has been blocked out and that the company plans to construct a dredge on the property in July. Water will come from nearby wells.

★**Gabbs Exploration Co.** is now producing about 70 tons of tungsten ore daily, and is operating two shifts daily, six days weekly. The mining method is shrinkage stoping. Crews are now drifting on the second level, developing it for extraction. The company operates its own 100-ton mill. L. D. Dougan manages the property, and Coleman Harcourt is general superintendent.

★**Blue Diamond Co.** recently installed a new dust collecting system at its gypsum mill in Clark County.

★**A new 5-yd. electric shovel,** the first of four, arrived at Anaconda's Yerington property in mid-April. Each shovel comes in loaded on five flat cars.

★**Nevada Scheelite** has installed two-way f-m radio facilities between its office in Fallon and the mine near Rawhide. The tower near Manager Art Challstrom's office in Fallon is in line-of-sight with one 60 mi. away, a few hundred feet from the mine. Two-way equipment is also mounted on trucks which travel the Fallon to Rawhide route.

★**John Uhalde and Associates** are open-pitting for iron ore on a property 30 mi. south of Battle Mountain which they have leased from S. J. Walter. Uhalde's schedule calls for production of 200 tons daily. The property is said to contain 100,000 proven tons of 62% ore.

★**Elsewhere on the growing** Nevada iron front, Mineral Materials Co. plans steady production of 26,000 tons of iron ore monthly. Its Buena Vista property is said to have 4-million tons of high-grade magnetite. The ore goes to Japan. Miyako Shoji Kaisha, Tokyo trading company, announced that it is buying 2-million tons of iron ore from Nevada mines during the next fiscal year.

## NEW MEXICO

★**International Minerals & Chemical Corp.,** Potash Division, will start construction early this summer on a $2,500,000 plant to produce magnesium chloride and hydrochloric acid from potash deposits in the Carlsbad

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with

# Firestone TIRES

WHETHER you make or lose money on many jobs depends on tire performance . . . in rugged rock work, strip mining or heavy earth moving, you need tires specially designed and engineered to withstand torturous abuse.

Regardless of how big or how tough the job, Firestone has a tire that will meet your particular requirement. *You get more for your money with Firestone tires because there is more built into them.* The cut-resistant treads are extra thick and extra tough. The Gum-Dipped rayon cord bodies are reinforced with four extra impact plies. Sidewalls are double-thick, cut and snag-resistant. You get a Lifetime Guarantee with every tire.

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**Research Corp. Engineer** — Yes sir. Over 1200 installations prove the high collection efficiency of Research Corporation Cottrells.

In one installation, 6500 pounds of smelter dust containing 14% cadmium and 30% lead are recovered per day.

**Smelter Executive** — What about draft loss?

**Research Corp. Engineer** — It's extremely low—only a few tenths of an inch of water.

**Smelter Executive** — Do you actually guarantee performance?

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BC 139

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*122 South Michigan Avenue, Chicago 3, Illinois*


## New Mexico *(Continued)*

district. Stearns-Roger Mfg. Co., of Denver, is designing the plant.

★**United States Smelting, Refining & Mining Company**, of Salt Lake City, has been awarded a DMEA contract amounting to $581,842 for lead-zinc exploration at the Bullfrog mine in Grant County, N. M. The government will pay half.

★**Application** of C. F. Williams and C. L. Bradbury, of Santa Fe, has been approved for federal aid for copper exploration in Santa Fe County, the government paying half of the $167,400 to be spent.

★**Potash Company of America** has completed a new pilot plant for the use of its research department. Project Engineer Orrie Olson is in charge of development work. He is being assisted by John Alexander, chemical engineer; Mel Fritschy, chemical engineer, and Roger Nelson, junior chemical engineer.

★**Permission for Navajo** tribal members to assign uranium-mining permits to outside operators is temporarily stalled while the Indian Bureau considers what to do about other minerals discovered during the course of prospecting. When that problem is resolved, the permits are expected to bring a sharp increase in uranium output from Navajo lands in the "four corners" area. Under the system, individual Navajos will receive royalties of 2 to 5% of mine value of crude ore and the tribe will receive 10 to 20%. Two access roads which will cost a total of $282,000 have been certified by AEC as essential to national defense; they will speed haulage from northeastern Arizona to the new ore-buying station at Shiprock.

★**The Mine, Mill & Smelter Workers** Union, its local 890 and 20 members in Grant County, have been fined $37,790 by district court at Silver City on two counts of contempt of court. Cases were brought by the New Jersey Zinc Co., and grew out of a strike at Empire Zinc Co., at Hanover. The 15-month strike ended Jan. 26. Charges involved violations of a picketing injunction. Clinton Jencks, international representative of the union, said an appeal to the state supreme court would be filed.

## NORTH CAROLINA

★**Lionel Wright** and associates plan to reopen the Old Pioneer mine, about 10 mi. southeast of Concord in Cabarrus County. Mr. Wright says that recent samples taken to a depth of 30 ft. showed copper-gold assays of from $43 to several hundred dollars per ton. Associated with him in the project are A. B. Kluttz, E. M. Hobson, Harold K. Roberts and E. P. Kepley. The group has leased the mine from J. D. Mitchell of Kannapolis.

At Mary Ellen Mine—heavy media plant in building at left; conveyor on right delivers ore from crushing plant in pit *(see picture below)* where Telsmith Gyraspheres do fine crushing.

# crushing

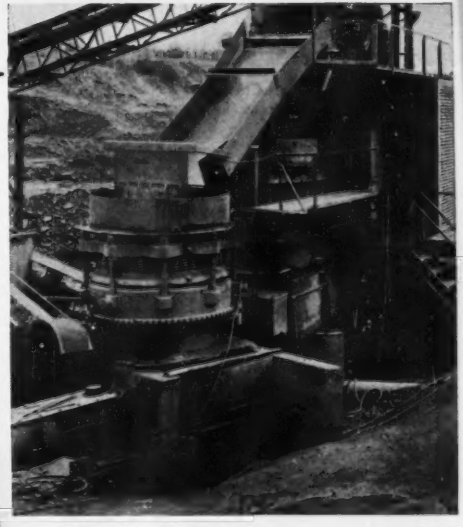
## BANDED TACONITE with

# TELSMITH *Gyraspheres*

## ON THE MESABI IRON RANGE

● On the Mesabi Iron Range of Minnesota, the Stanley Mining Co., Biwabik, Minn., is mining and treating banded taconite. Here their Mary Ellen Mine has two Telsmith Gyraspheres (shown at the right) which have, for the past two years, been doing a right good job of fine crushing for the mill feed. Plus 2-in. material passes to one No. 48 Telsmith Gyrasphere, with coarse crushing concave bowl, set at 1-in., and in closed circuit with a screen. Minus 2-in. plus ¾-in. oversize from the screen's bottom deck passes to a second No. 48 Telsmith fine concave Gyrasphere, set at ⅝-in., and thence to the beneficiation plant.

The *new* Telsmith heavier design Gyraspheres have a longer crushing stroke for greater capacity and a finer, more uniform product and new mechanical features for lower up-keep and longer life, resulting in lower crushing cost per ton.



*Get New Bulletin 274* Ain-32

describing all the new design and mechanical improvements of Style S Standard and Style FC Fine Crushing Gyraspheres.

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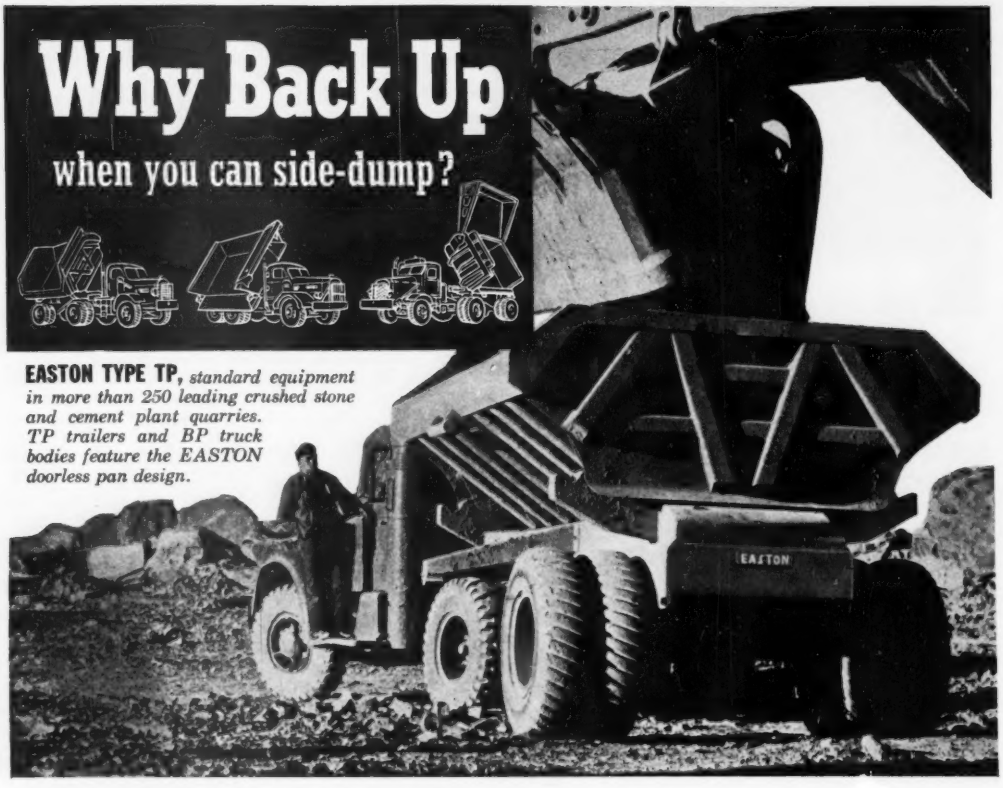
# Why Back Up

## when you can side-dump?






**EASTON TYPE TP,** *standard equipment in more than 250 leading crushed stone and cement plant quarries. TP trailers and BP truck bodies feature the EASTON doorless pan design.*

**EASTON TL Trailer with EUCLID**

**Side-dumping is the easy way.** You see where you're going...you cut out unnecessary abuse of truck motor, gears and driver...you save time, you save fuel. You spot your load without trouble. *You roll up, dump and roll on!*

Side-dumps give you big capacity and big loading area plus wide, unobstructed discharge...and rugged, rock-proved EASTON construction, individually designed to meet your specific hauling requirements.

For the big, new off-highway hauling value, team up an EASTON truck body or trailer with the truck or tractor of your choice. For complete information outline your haulage requirements to:

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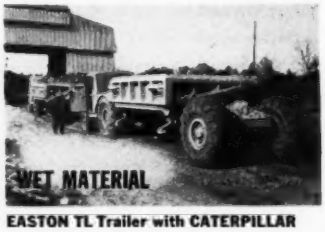
**EASTON TD Tandem Trailer with MACK**

**EASTON BD Truck Body with AUTOCAR**




**EASTON TL Trailer with CATERPILLAR**

# EASTON SIDE-DUMPS

B-1082

## North Carolina *(Continued)*

The Old Pioneer shaft goes down to about 180 ft., and is thought to have been idle since Civil War days. Wright says the mine will be worked underground at first and that there is a possibility they will do some placering later on.

★**Walter S. Flynt** of Crossnore has been appointed manager of the domestic mica purchase program of GSA. Headquarters will be at Spruce Pine, where a depot will be established. The depot will buy mica from North and South Carolina, Virginia, Georgia, and Alabama.

★**Lawrence Kilby** and John Blalock are stepping up production at their mica mine near Waynesville in Haywood County. They are now working four men on a 40-hour week, expect soon to employ more men and work a 50-hour week.

★**Mineral Marketing and Finance Corporation, Inc.,** was incorporated by Frank Simpson and James Goad, both of Raleigh, and Beech Warren of Tucson, Ariz. Authorized capitalization: $100,000.

★**The city of Asheville** has withdrawn its offer to lease certain parts of its North Fork watershed. Two geologists who examined the mica finds turned in negative reports. Also, prospectors and miners have shown little interest —too many rattlers and copperheads there.

## OREGON

★**Lease of the Standard mine,** one of the oldest lode mines in Oregon, has been purchased from Bert Hayes by Ray Summers, who plans to begin new development work this year. Ore taken from the mine, while chiefly copper, contains cobalt and other minerals, including pyrite, chalcopyrite, arsenopyrite, cobaltite, glaucodot, bismuthinite, native bismuth, galena and sphalerite. Development of the property started about 1880, but its most active period was in the first decade of this century. The Standard is in Grant County.

★**Stripping operations** on black sand deposits near the coast north of Bandon have been started by Coast Minerals Co., Ltd.

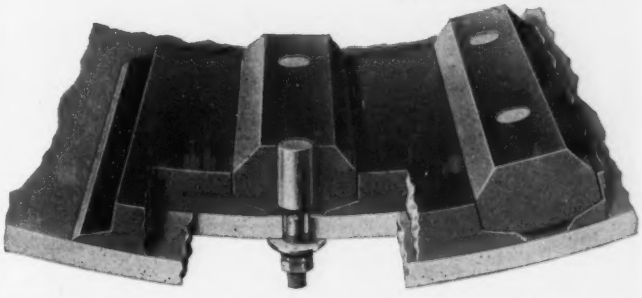
★**Cornucopia Gold Mines,** with an idle gold mine in Baker County, reported a net loss for 1951 of $31,205 in connection with maintenance, according to Carl M. Stolle, in the company's annual report.

★**Jack Wright,** with 185 lb. of equipment loaded in a wheelbarrow, stopped at Prineville, in April, on his way to the Greenhorn mining district, 45 mi. east of John Day. Equipment included bedding, a pick, shovel, gold pan, quicksilver, and tools for building


*When you install*

**U·S·S LORAIN ROLLED PLATE LININGS**

*you save*



**Save on installation time and labor.** Lorain Liner Plates are made to accurate size and in easily-handled sections . . . can be installed quickly and easily.

**Save valuable grinding space.** Because of the strength and resistance to breakage of the rolled steel from which U·S·S Lorain Rolled Plate Linings are made, plates of reduced thickness can be used, thereby increasing the usable diameter of the mill . . . boosting output.

**Save on "time out" for repairs.** Close fits between ends of plates and between plates and lift bars of U·S·S Lorain Rolled Plate Linings eliminate shell wash and allied troubles which result eventually in costly mill repairs.

**Save on replacement materials.** Lorain Liner Plates are so rugged they'll wear 'til they're paper thin without failing! And because the plates are interchangeable, severe localized wear at feed or discharge ends of the mill may be balanced just by reversing the worn plates to the opposite end. You get the full life of your linings when they're U·S·S Lorain Rolled Plate Linings!

*There are U·S·S Lorain Rolled Plate Linings to fit any type of mill— for wet grinding or dry. Available through leading mill manufacturers whose names will be furnished upon request.*

**For uniform, efficient grinding action specify U·S·S GRINDING BALLS, too**

● For still lower grinding costs and higher grinding efficiency, specify U·S·S Grinding Balls for your mill. They're made to exacting specifications . . . are carefully tested from raw materials to finished product to assure surface hardness and maximum hardness penetration. Available in diameters from ¾" to 5". For further information send for our free booklet on U·S·S Grinding Balls.

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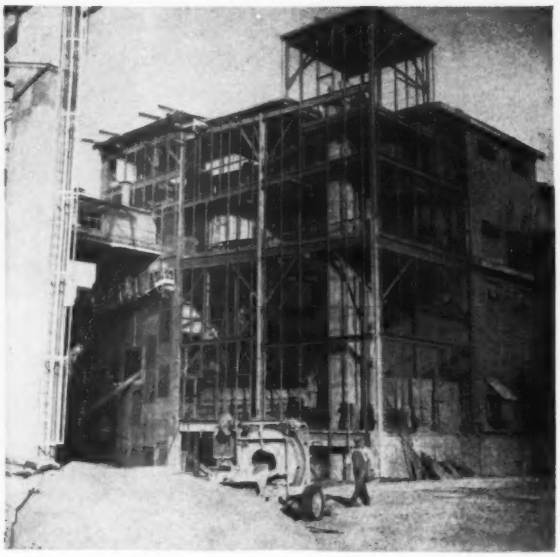
**U·S·S LORAIN ROLLED PLATE LININGS AND U·S·S GRINDING BALLS**

USS

2-462

UNITED STATES STEEL

# 110 ADDED BARRELS PER HOUR



Enlarging and modernizing the grinding room of this large cement plant provided a *gain in finished product* which far outweighed the costs involved.

Consult Stearns-Roger as to how to eliminate "bottle-necks" and increase both your plant production and efficiency.

Gunite...one of many modern types of wall construction employed by Stearns-Roger in buildings which house industrial plants.

**COMPLETE NEW PLANTS OR ADDITIONS TO EXISTING STRUCTURES**

***Undivided Responsibility***

- **ENGINEERING**
- **DESIGNING**
- **MANUFACTURING**
- **CONSTRUCTION**

**Stearns-Roger**

THE STEARNS-ROGER MFG. CO. DENVER COLORADO


## Oregon (*Continued*)

sluice boxes. He had traveled from Arizona and reported his best strike in the Chicken Creek area east of Baker where he said a pocket ran $2,600 a ton in gold.

★**The Oregon Department** of Geology and Mineral Industries has sent a questionnaire to chrome miners to determine what Oregon's production will be under present quotas, and what increase could be expected if purchase quotas were raised.

## UTAH

★**Clark Wilson** reports that the new Nordberg hoist on the Mayflower tunnel level should be completely installed sometime in July. The hoist is installed underground. Involved in the installation were the cutting of a 190-ft. 45-deg. rope raise, and a hoist room 20-ft. high, 60-ft. long, and 35-ft. wide. One major problem was bringing the big hoist in through the Mayflower tunnel.

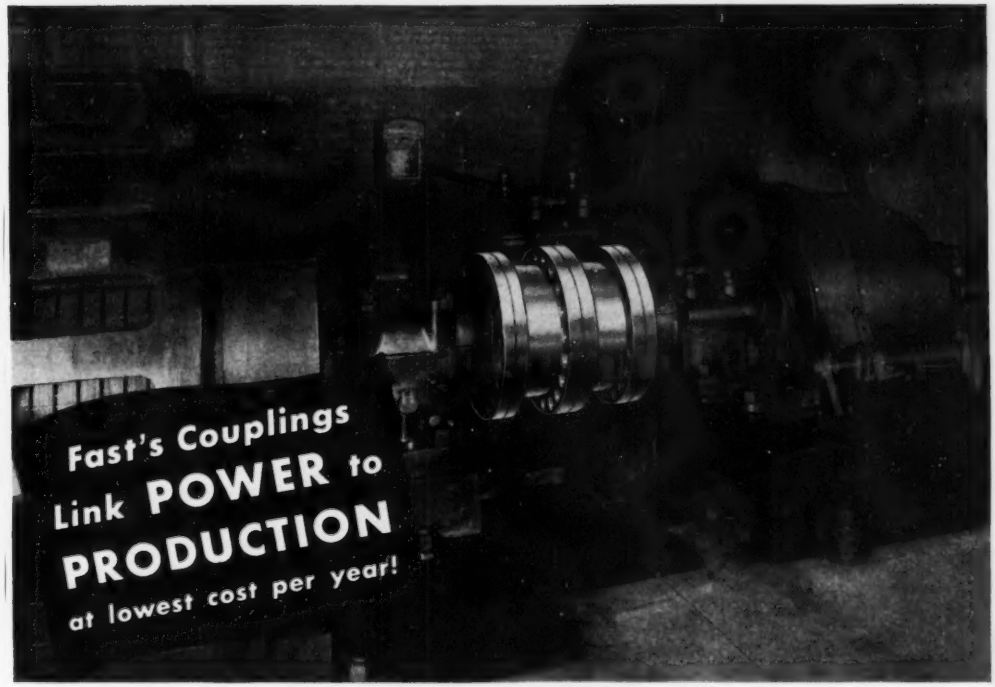
The old hoist, which had reached its effective limit, will still be used in a third compartment of the Mayflower shaft.

The new hoist will operate in two compartments (one for ore and one for waste) of the Mayflower shaft, and will work effectively at from 1,000 to 3,000 ft. of depth. Development of the New Park mine at depth is following closely. A station has been cut on the 1,630 level, and a second one is to be cut on the 1,755. Future plans also call for deepening the Mayflower shaft.

★**Significant but disconcerting** ore production trends were revealed in April by a study prepared by the Utah Mining Association for presentation before a WSB panel in Washington, D. C. The panel was considering evidence taken at hearings in Salt Lake City on wage disputes involving the New Park Mining Co., Combined Metals Reduction Co., and U. S. Smelting, Refining and Mining Co.

Figures produced by the Utah Mining Association showed that, despite mechanization of properties, the ore-per-miner output in Utah has dropped markedly since 1939. According to Association Manager Miles P. Romney, 452.32 tons of ore per miner was produced in underground operations in the state in 1939. This figure dropped to 322.86 tons of ore per year per miner by 1950. "A downward trend in production per man is particularly disconcerting in view of the sizeable increase in mechanization of mining, loading and transporting of ore in Utah operations."

The study indicated what UMA Manager Romney termed "a terrible toll of large, medium and small operators exacted by economic conditions." The number of active nonferrous metals producers in Utah was shown to have fallen from 175 to 84 in 1950.

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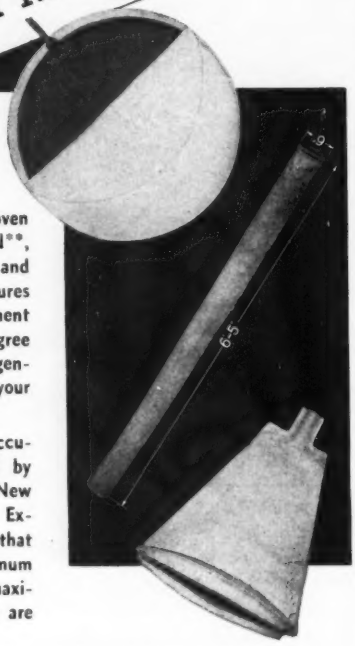


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## Utah *(Continued)*

★**A walkout was called at ASARCO's** Garfield smelter on April 26 when the company insisted that the Steelworkers local respect the company's right under the existing contract to plan overtime work and make arrangements with the men. The union told its men to refuse such work because the company had docked men who had participated in a work stoppage a few days before. The walkout resulted, and it remained in effect until April 30, when both company and union accepted the following agreement:

"Normal operation shall be resumed as soon as possible, with all employees being restored to full employee status. The existing practice of requesting employees to double over when necessary shall continue, the company reaffirming its right to make work assignments, including necessary overtime work and recognizing the right of the union to present and process grievances arising therefrom in accordance with the contract."

★**Uranium bulks large** in the latest list of development and exploration loans for Utah firms released by the DMEA office. Loans, with total project costs in parentheses, follow:

Excalibur Uranium Corp., Green River, Emery and Grand Counties, $53,363 ($59,293), uranium; Canary Mining Co., Daggett County, $24,052 ($26,725), uranium; J. R. Simplot Co., Inc., Wayne and Garfield Counties, $64,340 ($71,499), uranium; White Canyon Mining Co., San Juan County, $47,138 ($52,376), uranium.

Also Kentucky-Utah Mining Co., Washington County, $17,500 ($35,000), copper, lead, zinc; Harrington Mines Co., Beaver County, $62,620 ($125,240), lead and zinc; Cecil Woodman, Tooele County, $9,284 ($12,379), for tungsten.

★**Three scholarships** to the University of Utah, each providing $500 for four-year courses in mining and geology and nonferrous metallurgy are being offered to sons of day-wage and salaried employees at Utah operations of the United States Smelting, Refining and Mining Co.

★**Park Utah Consolidated Mines Co.** has reported a net income of $272,412 for 1951 as against $186,345 for 1950. Vice President and General Manager Paul H. Hunt noted that total income of the firm rose sharply from $1,101,920 in 1950 to $2,006,095 in 1951. However, mine operation and exploration expenses were $1,518,771 last year as against $749,098 for 1950.

Park Utah's operations at Park City, Utah, in 1951 produced 2,118 oz. of gold, 315,608 oz. of silver, 9,249,384 lb. of lead, 11,294,400 lb. of zinc and 22,605 lb. of copper. The company's gold, silver, and copper production nearly doubled 1950 output, lead production rose nearly 2,500,000 lb., and zinc output was up some 3-million lb.

Smelter receipts of $1,936,942 were

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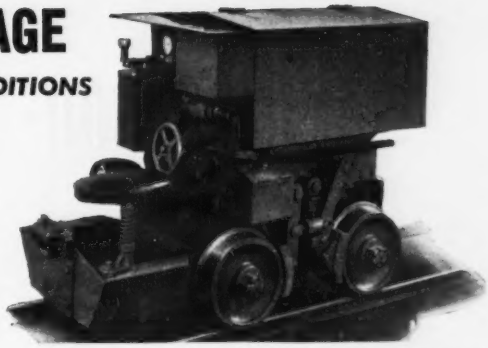
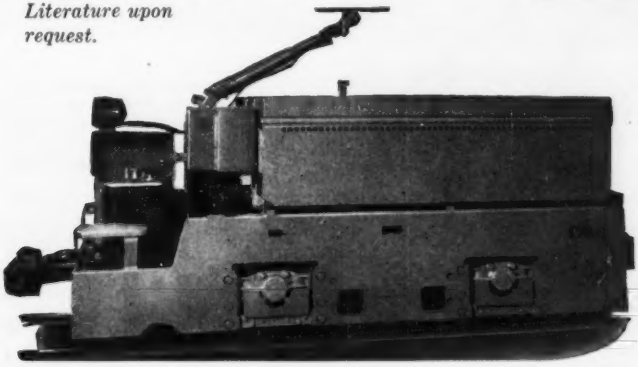
Need a Locomotive? Trammer, Trolley and Storage Battery or a combination of the latter two . . Jeffrey builds a complete line and good ones. Whatever your requirements there is a type and size to meet all conditions in metal mining haulage or tramming.

Features—there are plenty of them . . all that over fifty-five years of experience in design and manufacture can put into them. Three types are shown —study them—read the description of each.

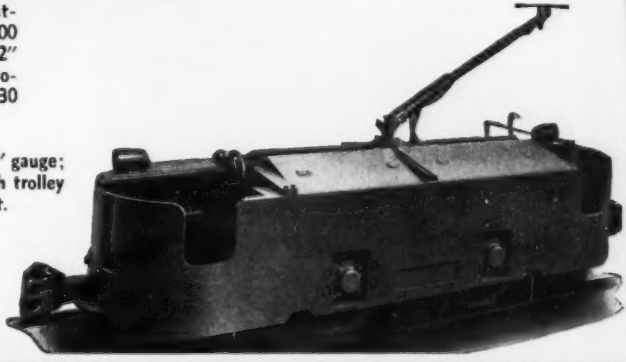
*Literature upon request.*



Jeffrey Trammer Locomotives are of compact construction and will meet gauges down to a minimum of 18". A storage battery Trammer is shown above—it has a 6 H. P. motor. It weighs 1½ tons and can be arranged for trolley or cable reel operation. Motorman's deck can be removed to shorten length for entering cage. 32" wide, 46" high and 62" long with deck.



Jeffrey combination trolley and storage battery locomotive with chassis weight of 12,000 pounds. 30" gauge, length 7'2", width 52" and 60" high with trolley locked down. Two-rate battery charging from trolley. Two 30 H. P. motors.



Right: Jeffrey 6-ton Trolley Locomotive. 24" gauge; length 13'8"; width 46"; height is 54" with trolley pole locked down. Literature upon request.

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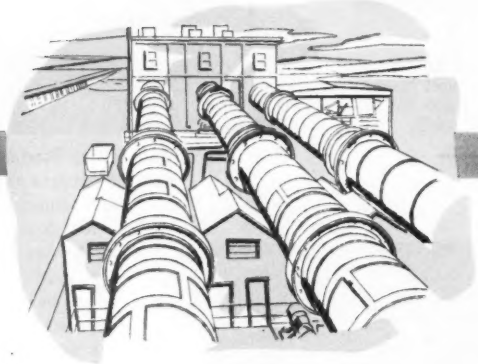

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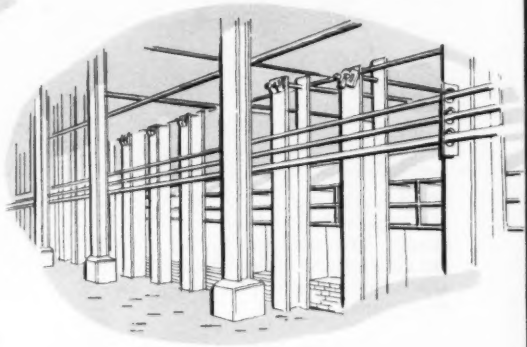
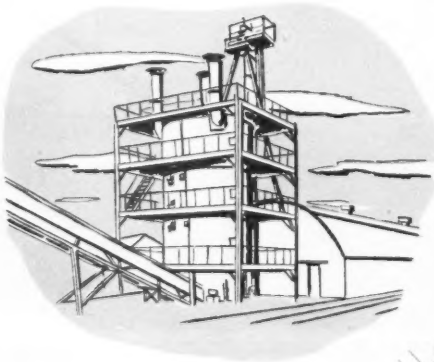
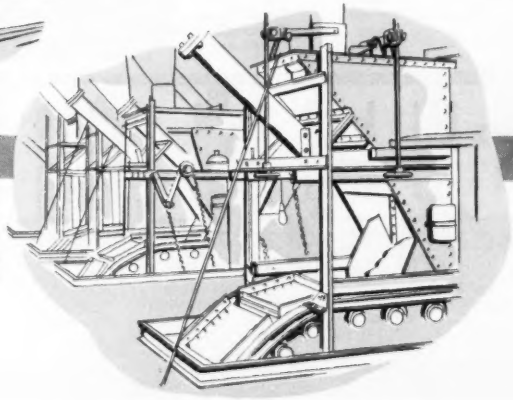




Harbison-Walker Roaster Brick meet the exacting requirements for every kind of operation.



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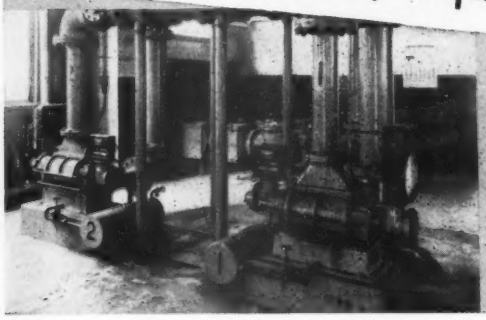

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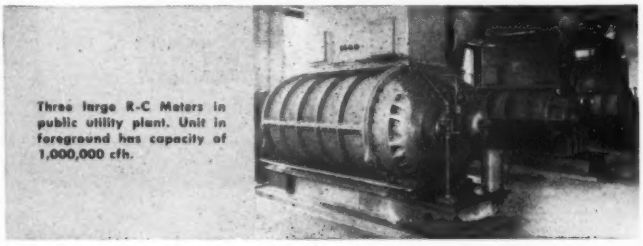

Three large R-C Meters in public utility plant. Unit in foreground has capacity of 1,000,000 cfh.

ROOTS-CONNERSVILLE BLOWER

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### Utah *(Continued)*

set at $35.26 per ton in 1951 as against $28.25 per ton in 1950. In addition to ore mined, lessees shipped 16,617 tons of siliceous fluxing ore from the company's Ontario dumps in 1951 with a smelter value of $45,831.

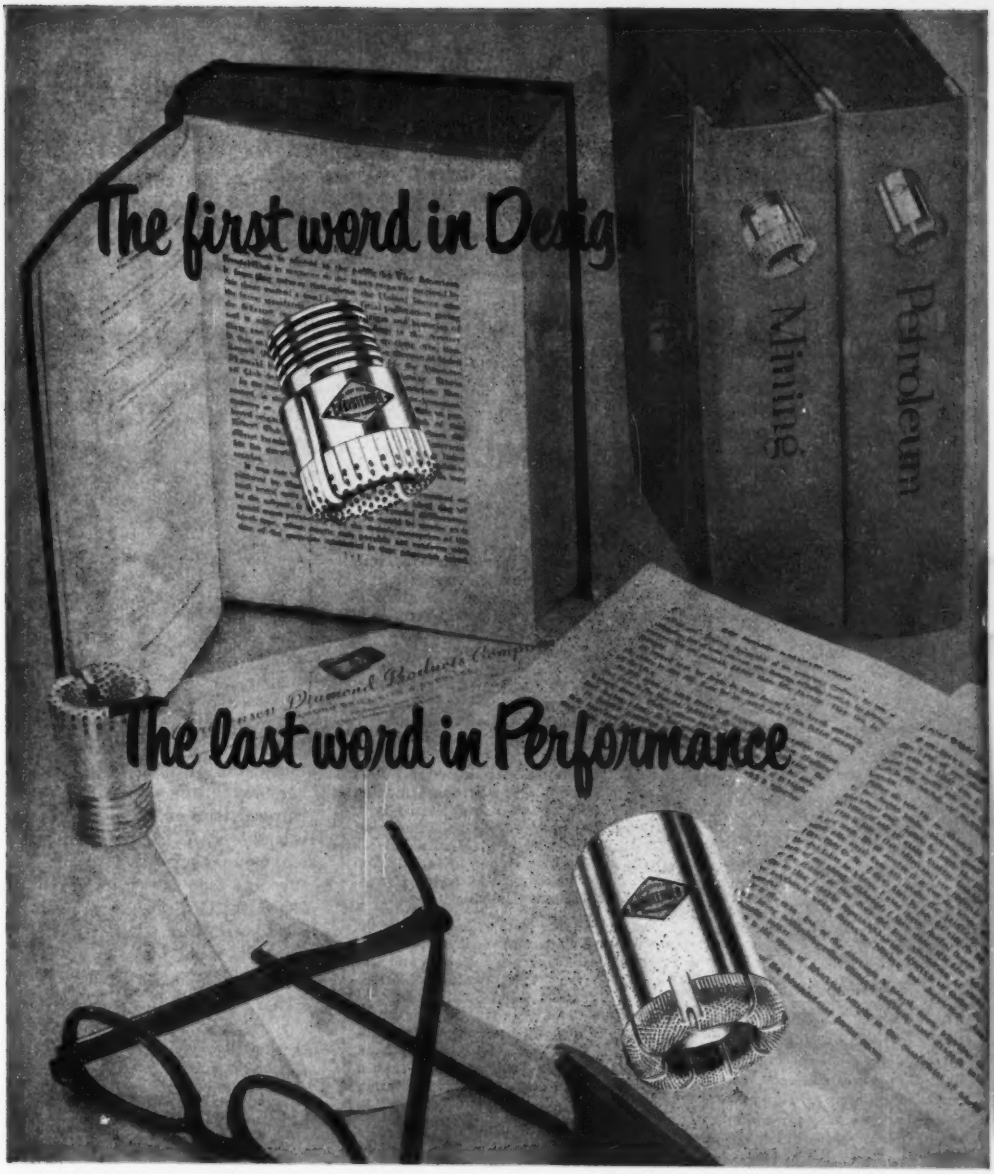
## WASHINGTON

★**Amco. Mining Co.** reports striking high-grade tungsten ore at the 324-ft. point of a drift on its property northwest of Addy. Tunneling had been in progress since late in January. At the point of intersection, the floor of the tunnel is 200 ft. from the apex of the hill. Amco was working four men in April, and planned to start a second shift soon. Drifting will continue to 600 ft., according to Jerry Fowler, who is in charge of operations, and a 50-ton capacity mill may be built this season. Amco was working on a DMEA contract.

★**Washington's lead production** was up almost 1% in February, according to the USBM report. Output was 1,142 tons, which compares with a monthly average in 1951 of only 663 tons. Zinc production at 1,624 tons, was down slightly from January, up slightly from the 1951 monthly average, however.

★**Earl B. Gibbs** is producing 60 to 65 tons of ore daily from the Young America mine in the Colville district. Mr. Gibbs recently reported that high-grade ore had been found in three new places, and that assays across one 5-ft. face ran 27.8% lead, 9.6% zinc and 113 oz. of silver. Gibbs, you will recall, was a partner of Ira M. Hunley in developing the Bonanza to a point where Gibbs & Hunley sold it to Anaconda for $2-million—$500,000 of which they received as a down payment. Gibbs took over the Young America shortly after that on a 50-50 agreement with Young America Mines, Inc., and has since spent $100,000 on development. Concentrates from his mill have been going to the Bunker Hill smelter at Kellogg, Idaho.

★ **American Smelting & Refining Co.** expects to start milling at the Van Stone property about September this year if equipment deliveries are on schedule. Approximately 50,000 tons of waste were stripped in preparation for open-pit mining during the month of April. Some ore will be stockpiled as stripping progresses. At the end of April, the mill building was nearly completed, and total construction was 70% completed. Steel work for the crushing plant was up. Excavation by Isbell Construction Co., the mining contractor, is under way at two separate orebodies. The open pit at the larger will be 1,400 by 400 ft. at the top, and the smaller open pit will be about one-quarter that size. More than 30 men were at work in the mine during April.

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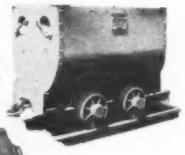
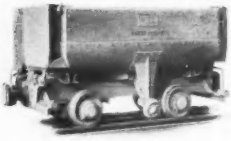
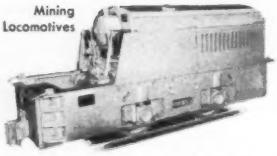

U-Body Mining Tubs

Three-Way Dump Ore Mine Cars


Granby Type Cars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## Washington *(Continued)*

★**Antimony and quicksilver** are the goals of two recent DMEA exploration projects. Ray Whiting and Milton Roumm will spend $18,425 ($13,819 from the government) to explore their cinnabar property west of Naches in Yakima County. G.O.P. Antimony Co will spend $16,080 ($12,060 from the government) to explore the Bales antimony property near Twisp in Okanogan County.

★**Grandview Mines** declared a 2¢ dividend payable on June 16 (Grandview's property is worked by American Zinc on a 50-50 basis). President Karl W. Jasper reports that total dividends are now 26½¢ per share, and the company has thousands of dollars in unclaimed dividends.

# IN CANADA

## BRITISH COLUMBIA

★A new move to expand and integrate **British Columbia's small steel industry** into a major operation based on B.C. iron ore has been made with the formation of Western Canada Steel Ltd., which consolidates three firms at Vancouver. The new company takes over Vancouver Steel Co., Ltd., Vancouver Rolling Mills Ltd., and Pacific Bolt Manufacturing Co.

The three companies, headed by C. D. Hobbs, managing director, are an integrated industry and could be expanded by additional electric furnaces for production from British Columbia ore. Hobbs has been negotiating with federal officials for establishment of such a steel industry. Much of B.C.'s iron ore is now shipped to Japan from Quinsam Lake on Vancouver Island, and from Texada Island.

★Consolidated Mining & Smelting Co. will participate in the development of the **United Minerals, Ltd.** lead and zinc mine in northwest Thailand. Agreement signed between Cominco and the Bangkok firm provides for continued production while the exploration program is going on. The mine has been shipping ore to Trail for more than a year. J. J. McKay, of Cominco's mines department, is going to Thailand to take charge of the operation.

★**Canadian Exploration Ltd.** has put into operation a new 300-ton mill unit at its Emerald mine near Salmo. The new unit is in addition to the 250-ton plant financed by the Canadian Government when it re-acquired property from Placer Development, the parent company. Total output is expected to reach 600 tons daily. Tungsten for the mill will come from CE's Feeney and Dodger mines and from government property.

★**Big Four Silver Mines Ltd.** is being wound up and its properties in the Portland Canal area invested in a new

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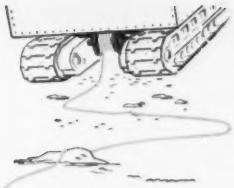

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## British Columbia (*Continued*)

company, Cassiar Consolidated Mines on a 4½-Big-Four-for-one-Cassiar-share basis. Under an agreement with Consolidated Mining & Smelting Co., 2-million of the 3-million 50¢ par value shares will be reserved for Cominco, which proposes to proceed with development. In addition to the Big Four properties—the former Porter Idaho, Prosperity, Silverado and Silver Ridge—Cassiar will own the Ben Bolt mine.

★**Western Uranium Cobalt Mines Ltd.**, with its new 200-ton mill at the Rocher de Boule copper-gold-tungsten mine near Hazelton almost ready for operation, plans to double output of the nearby Red Rose tungsten mine and to put the Rocher de Boule mine in production. The Red Rose mill averaged 64 tons daily in March, is expected to reach total capacity of 150 tons by late spring.

★**Kennametal of Canada Ltd.** is exploring a tungsten prospect in San Juan Valley near Port Renfrew on the southwest coast of Vancouver Island and plans a mining and milling operation if sufficient ore is proved.

★The federal government and Consolidated Mining & Smelting Co. of Canada Ltd. are reported to have reached an agreement for construction this summer of a 70-mi. bush road to the extensive lead-zinc area of Pine Point on the south shore of Great Slave Lake. The road would run from a point near Hay River, NWT, on the Mackenzie Highway, across the Alberta border, to Pine Point.

★**Reeves Macdonald Mines Ltd.**, Salmo district, is installing an additional crusher expected to increase monthly milling rate from the present 25,000 tons to 30,000 tons. Funds totaling $2-million borrowed to get the property into production have been repaid from proceeds of the first two years' operation.

★**Giant Mascot Mines Ltd.**, expects to increase its milling rate by 100 to 150 tons daily by June at its lead-silver mine at Spillimacheen. A new 400-450 ton grinding unit has been installed and present flotation equipment can handle 300 tons daily. A new main haulage level is being driven at mill elevation to replace the former too-steep haulage, and a three-compartment shaft is to be sunk from the No. 6 level to establish two new levels at 150-ft. vertical intervals.

★**Granby Consolidated Mining, Smelting & Power Co., Ltd.** net profit in 1951 was $375,738, nearly double that of 1950, but ore reserves declined by 1,830,000 tons, slightly more than the ore extracted. Production included 7,947 oz. gold; 172,331 oz. silver; and 25,975,054 lb. copper from 1,794,882 tons of ore grading 0.899% copper. Company earned an average price of 29.90¢ per lb. for copper by selling a portion of output to European markets at higher prices than obtained in Canadian and U.S. markets.

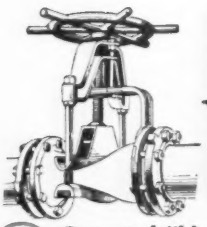
★**Black Diamond Tungsten Ltd.** reports that completion of a road to the portal of a new exploration tunnel at its Atlin property has made possible an immediate start on the project, which will give 300 ft. of depth below the crest of No. 5 zone outcrop. The operation is financed and managed by Transcontinental Resources Ltd.

★**Jackson Basin Mining Co.** in the Slocan is building a 50-ton mill with initial production scheduled for October.

★**Pacific Nickel Mines Ltd.** will resume exploration this year on its 82-claim nickel-copper property near Choate, 107 mi from Vancouver in the Yale Mining division. Work last year showed extension of a favorable hornblende pyroxenite formation for two claim lengths in previously unexplored ground.

## MANITOBA

★**Hudson Bay Mining & Smelting Co. Ltd.** reports ore reserves as of Jan. 1, 1952, at 18,102,400 tons, averaging .078 oz. gold, 1.07 oz. silver, 3.15% copper, and 4.1% zinc. This includes wholly owned or controlled properties within trucking distance of Flin Flon, but excludes Cuprus Mines Ltd.

**Rubber Pinch Valves for Abrasive Pulps and Corrosive Liquids**

**Patented "hinged" Rubber Sleeve**

Recesses molded into sides of sleeve act as "hinges" during compression, eliminating excessive strain and wear. These valves have been used successfuly for many years by various industries, wherever there is a problem of transporting abrasive or corrosive pulps or liquids. Here are some of the other proved advantages of these valves:

- **Long Life Under Severe Conditions**
- **Unobstructed Flow Passage**
- **Positive Closure on Solids**
- **No Working Parts in Contact with Pulps or Liquids**
- **Only ONE Wearing Part**
- **Withstands All Chemicals Not Harmful to Rubber or Neoprene**
- **Sizes from 1" to 12" dia.**
- **Withstands pressures up to 150 psi.**

New free **CATALOG** gives complete information on Massco-Grigsby Rubber Pinch Valves; Marcy grinding mills for laboratory, pilot plant and commercial grinding; laboratory crushers and pulverizers.

**The Mine & Smelter Supply Co.**

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**Offices in Salt Lake City, El Paso, 1775 Broadway, N.Y.C.**

# Steel

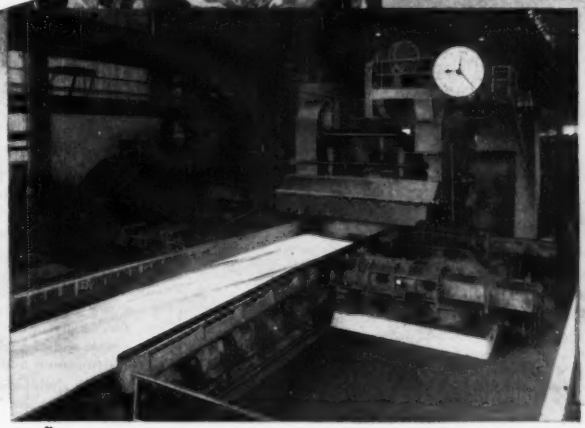
## BULWARK OF FREEDOM AND...

The changing pattern of progress, West of the Mississippi and East of the Rockies, is readily traced through the pages of Sheffield history.

First products of record were produced in 1888 to meet the needs of the great railroad building expansion. Following the rail lines came the fabulous development of agriculture, construction, mining, highways, manufacturing, oil and ship building.

Each of these facets of industry presented needs for steel in different shapes and forms. In meeting such kaleidoscopic requirements, the Sheffield organization acquired a vast accumulation of skills, techniques and facilities and, today, produces a wider diversity of steel products than any other similar steel making set-up in the country.

Some phases of Sheffield Steel production have expanded 3½ times in the last 10 years while Sheffield's overall production has more than doubled.



**Fast and Powerful New Plate Mill**—Fabricators of such steel products as pressure vessels, processing and storage tanks for liquids and gases, transportation line pipe, etc., require plate steel in far greater quantities than the slow cumbersome plate mills of yesteryear could produce. A new, powerful, 4-high plate mill at Sheffield's Houston works now rolls white hot slabs into long lengths of steel plate in a matter of minutes for shearing into sections to meet fabricators' needs.

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**STEEL**
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HOUSTON KANSAS CITY
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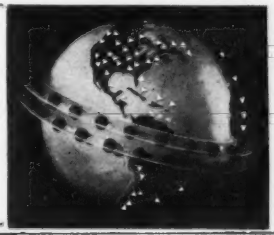
COPPER-MOLYBDENUM ALLOY
*Grinding Balls*
USED and PROVED ALL AROUND THE WORLD

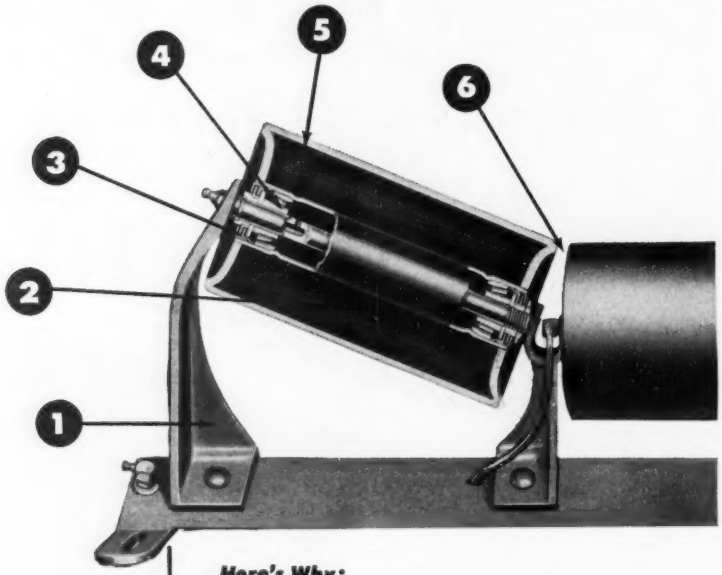


IRON AND STEEL *SCRAP* MEANS . . . . . .

**MORE STEEL FOR AMERICA**
*More Money In Your Pocket!*

*GET YOURS OFF TO*
THE DEFENSE LINES NOW!

# *make sure you get full value for your belt conveying dollar*




When you're figuring the cost of moving material by belt conveyor, it's important to remember that the belt idler, more than any other item of equipment, determines how low the ultimate cost per ton of material handled will be. Power consumption, belt life, maintenance costs, steady production flow, are all largely dependent on the ability of the idlers to keep rolling.

To make sure you get the most for your belt conveying dollars, you'll find it pays to standardize on Rex® Belt Conveyor Idlers.

***Here's Why:***

1. **The supporting brackets are unbreakable in normal operation. They remain rigidly tight and will stand abnormal usage without breaking.**
2. **The bearing mountings maintain positive bearing alignment under all conditions.**
3. **Rex Idlers have positive and permanent bearing protection against dust and dirt, and require minimum service attention . . . once every 1000 hours in normal operation.**
4. **Rex Idlers have high grade, precision, antifriction bearings with ample radial and thrust load capacity. This means lowest power consumption under all conditions.**
5. **The roll shells are of permanent unit construction with no joints to loosen or corrode. No replacements until idler is completely worn out.**
6. **The idler rolls are smooth and concentric and spaced in the idler assembly to protect the underside of the belt. The roll units are interchangeable for easy servicing.**

**If your idlers have all these features, you're getting the most for your idler dollar . . . you're using Rex Idlers. If you're using any other idler, it can't possibly have all these outstanding features . . . you can't be getting lowest possible cost per ton handled on your belt conveyor.**

So, if you haven't yet standardized on Rex Idlers, call your nearest Chain Belt Field Sales Engineer. He'll give you all the details. Or, if you prefer, write for Bulletin 51-81. Chain Belt Co., 4679 W. Greenfield Ave., Milwaukee 1, Wis.

CHAIN BELT REX COMPANY ®

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*Distributors in principal cities in the United States and abroad.*

# PUTTING IT ON THE LINE...

## *in Industry after Industry!*

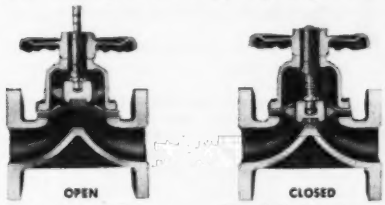
### The Grinnell-Saunders Diaphragm Valve . . . . . .

***Here's why*** . . . Piping in today's complex industrial plants is an exacting science involving the handling of highly corrosive fluids, gases, compressed air, beverages, foods and suspended solids . . . in lines where corrosion, abrasion, contamination, clogging, leakage and maintenance are costly factors. Under such conditions, the amazing adaptability of the Grinnell-Saunders Diaphragm Valve explains its acceptance by industry after industry.

Bodies of this versatile valve are made in a variety of metals — iron, stainless steel, bronze, aluminum and others. *But of more importance* is the fact that a body of cast iron (a metal not in short supply) can be lined with glass, lead, natural rubber, neoprene and other materials which, in many instances, handle corrosive fluids *better* than metals.

Diaphragms come in natural rubber, neoprene, butyl, hycar, a special synthetic for foods, and KEL-F. This last is chemically inert to all acids and alkalies in all concentrations with the exception of molten alkali metals.

From this broad selection of materials, the problems which the Grinnell-Saunders valve can solve are extremely varied. No wonder industry after industry is putting it on the line.

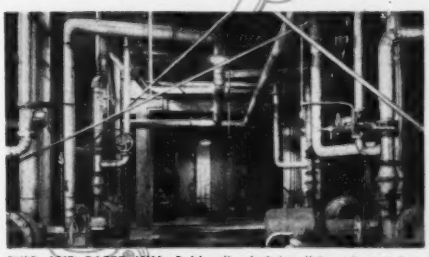



Showing rising spindle . . . valves are available with rising or stationary spindle.

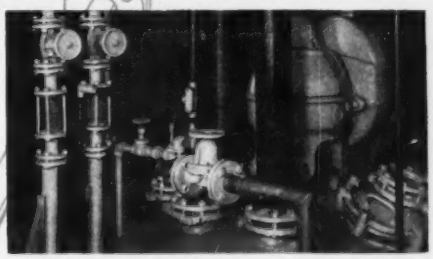
KEL-F diaphragm, using special rubber backing cushion and floating tube nut design.

**CHECK THESE GRINNELL-SAUNDERS FEATURES...**

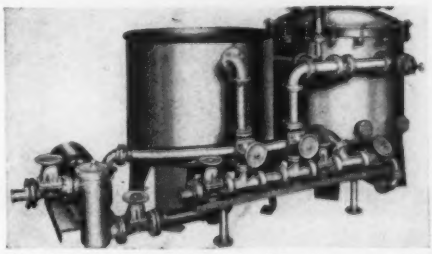
- Diaphragm absolutely isolates working parts from the fluid.
- Diaphragm lifts high for streamline flow in either direction.
- Diaphragm presses tight for positive closure.
- Body, lining and diaphragm materials to suit service.
- Simple maintenance — diaphragm easily replaced.



**PULP AND PAPER MILL.** Rubber-lined Grinnell-Saunders Valves on stainless steel piping handle sulphate pulp stock in bleach plant of Potlatch Forests, Inc., Lewiston, Idaho.



**CHEMICAL PLANTS.** Glass-lined Grinnell-Saunders Diaphragm Valves, with KEL-F diaphragms, handle chlorinated organic chemicals at Hooker Electrochemical Company, Niagara Falls, N. Y.



**EQUIPMENT MANUFACTURERS.** Grinnell-Saunders valves with rubber linings are standard on filtration equipment for solution clarification, made by Industrial Filter & Pump Mfg. Co., Chicago, Ill.

# GRINNELL

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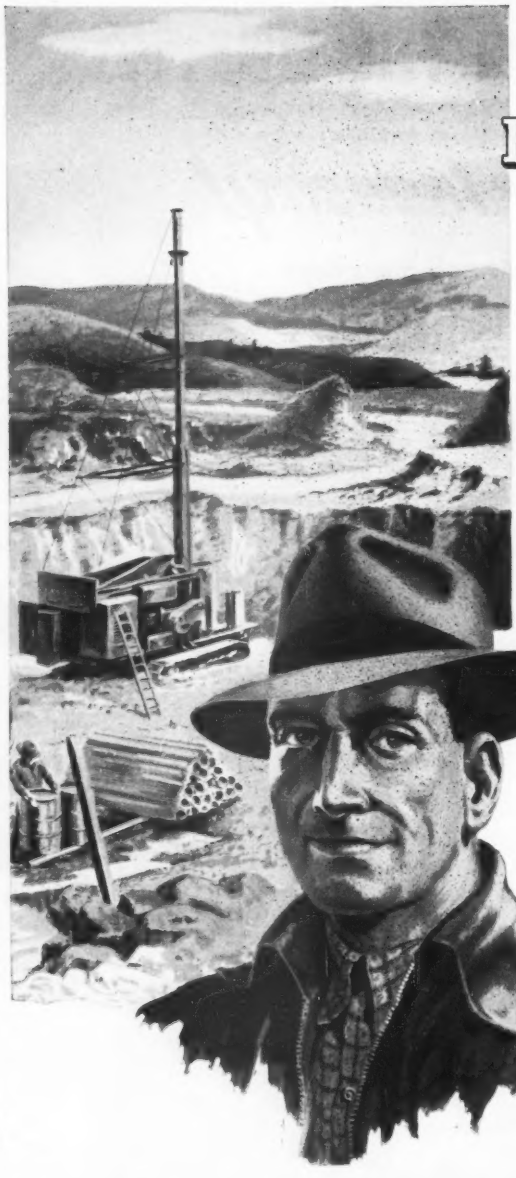


# PEAK EXPLOSIVE POWER

***In planned shooting you get peak explosive power if you***

**"Hook Up and Detonate with PRIMACORD"**

There's no limit to the number of holes which may be fired at one shot, yet Primacord detonates every cartridge in every hole — no caps in your rock pile. And by proper planning you can shoot the front holes a split second ahead of those in back giving you better fragmentation.

Primacord is easy to handle in the pits for it is light in weight, hooks up quickly in square knots or half hitches, yet can't be detonated without a blasting cap. Stray currents, sparks or even an ordinary shock won't set it off.

Save time and get more effective explosive power with Primacord.

*Ask your explosives supplier or write us direct for further facts*

**THE ENSIGN-BICKFORD COMPANY**
**SIMSBURY, CONNECTICUT**

***Also Safety Fuse since 1836***

Made in several types. **PLAIN PRIMACORD** for shallow holes and surface trunk lines; **REINFORCED PRIMACORD** for deep holes and resistance to abrasion; **WIRE COUNTERED PRIMACORD** for deep, ragged holes; and **PLASTIC REINFORCED PRIMACORD** for deep, wet holes and river crossings.

# *Use* PRIMACORD®

## *The PROVED and APPROVED DETONATING FUSE*

★**Gunnar Gold Mines Ltd.** reports that metallurgical investigation of its chromite ore from Euclid Lake is to continue. The original drilling outlined a deposit 1,200 ft. long and 120 ft. wide grading 6% to 7% chromic oxide. Under a new metallurgical process, officials calculate that a 30% concentrate would be commercial. Tests on bulk samples indicate that the material can be concentrated to 45%. Additional ground has been staked adjoining the original group of claims and diamond drilling will be carried out this season. The property is 80 mi. northwest of Winnipeg.

★**San Antonio Gold Mines Ltd.** reports that 191,536 tons were milled during the 12-month period ending Dec. 31, 1951. Recovery amounted to $1,843,859. The average recovery per ton was $9.63 compared with $10.54 for 1950. Cost per ton, exclusive of taxes and depreciation, averaged $5.89 as against $5.75 in the preceding year.

## ONTARIO

★Hollinger is again producing tungsten concentrates according to *The Hollinger Miner* which reports that an 85-ton scheelite mill has been started up. At capacity, this mill is capable of producing about 1,700 lb. of scheelite concentrates per day. The mill was constructed during World War II, and up to the time of its shut-down in 1943 it had produced 435,000 lb. of high-grade scheelite from 53,000 tons of ore. The scheelite-bearing rock feeding this mill is mined and handled separately from mine gold ore. Production from the gravity-flotation mill has totaled about 25 tons of high-grade scheelite concentrate during the December to mid-March run.

★Ontario is to have another new base metal producer. Funds are being raised for mill installation on the Hess Twp. (Sudbury) property of **Geneva Lake Mines.** This lead-zinc prospect has been idle for some time, but has an estimated reserve of 114,000 tons averaging 3% lead and 10% zinc. During World War II some 80,000 tons were milled under government operation. A deal has been made with Bidgood Kirkland Mines whereby that company's 150-ton mill will be moved to the property, with production expected to start next winter.

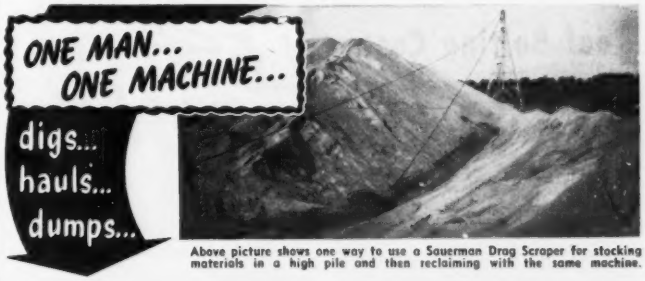
★Shaft-sinking has also been started by **New Mosher Longlac Mines** on its property west of MacLeod-Cockshutt in the Little Long Lac area. Financed by Hoyle Mining Co. and Hardrock Gold Mines, the operation has been boldly conceived on the theory that the ground carries the westerly extension of MacLeod's "F" zone, which changed the future of that gold mine completely.

★**Preston East Dome Mines** reported ore reserves of 471,340 tons grading 0.321 oz. gold per ton at the close of 1951. At the close of 1950, there were 458,245 tons with grade of 0.229 oz. The gain was due principally to excellent results in the west porphyry area, now being developed at depth from the winze put down two years ago to open eight new levels.

★Not quite so gratifying was the showing of **Madsen Red Lake Gold Mines,** whose annual report for 1951 showed decreases in ore reserves. Ore reserves above the 11th level dropped from 848,440 tons to 686,190 tons, with grade unchanged at 0.218 oz. gold.

★Canada's biggest gold mine, the **Kerr-Addison at Larder Lake,** now has gold in reserve worth more than $144-million. Ore reserves above the 2,500-ft. level at the end of 1951 totaled 16.7-million tons, ore more than enough for 10 years' milling at the record rate established last year. Net earnings were down during the year (84.5¢ versus $1.003 in 1950), but the big gold mine earned its 80¢ dividend with more than $200,000 to spare.

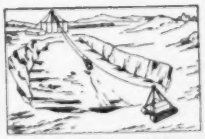
★**The Jalore Mining Co. Ltd.,** subsidiary of the Jones & Laughlin Steel Corp., has taken exploration options in four areas of southeastern Ontario. It had previously leased properties in the Michipicoten district of Ontario. The new areas will receive geophysical investigation this summer and will be diamond-drilled in promising locations.

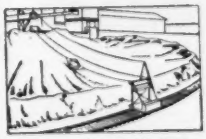
Above picture shows one way to use a Sauerman Drag Scraper for stocking materials in a high pile and then reclaiming with the same machine.

# SAUERMAN method...

***Simplifies Material Handling!***


Sauerman Slackline Cableway

Sauerman Scraper Excavator


Sauerman Scraper Stockpiler

Where materials are to be moved distances of several hundred feet or more, a Sauerman Drag Scraper or Slackline Cableway can cut the cost per cubic yard to a low figure because it is able to dig, haul and place the material in a continuous, straight-line operation, doing away with the expense of rehandling. The operation is smooth and rapid, producing large yardage with moderate expenditure of power.

The first cost of a Sauerman Machine is reasonable, maintenance amounts to very little, and the simplicity of operation makes it possible to place the control of even the largest installation in the hands of one operator.

Whether your project is large or small, there is a size and type of Sauerman machine suited to your requirements—a machine that will give you years of steady service at minimum expense.

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## QUEBEC

★High nickel-zinc values are reported to have been disclosed by diamond-drilling to date at the **Eastern Metals Ltd.** property located about 70 mi. southwest of Quebec City and about 7 mi. from the Quebec Central Railroad. Diamond drilling in the North Zone indicates an orebody 500 ft. long, 30 ft. wide, and 550 ft. deep, estimated to contain about 800,000 tons of ore having a value of $14 per ton in nickel and zinc with additional values of pyrite, copper, silver, and gold. Deeper diamond-drill holes are being put down. Equipment is being assembled for the sinking of a shaft to 600 ft. to prove the indicated North Zone. The deepest diamond-drill hole in the North Zone is reported to have cut a true width of 42 ft. averaging 1.52% nickel, and 2.59% zinc at a vertical depth of 550 ft.

★Shaft-sinking has been started by **Quebec Copper Corp.**, developing the former Huntingdon property near Eastman in the Eastern Townships. It will be taken down in one step to 900 ft., to permit establishment of levels at 550, 700, and 850 ft. Most of the shallower ore has been mined out in the previous operations.

Indicated ore in the vicinity of the old workings is estimated at 430,000 tons averaging 2.2% copper. The project is financed by East Sullivan Mines, which has option on company control.

★The coming season will be the busiest yet for the **Chibougamau area.** The four-compartment shaft being sunk by Campbell Chibougamau Mines is close to 250 ft., with the station for the first level cut at 125 ft. Shaft-sinking has been started by **Chibougamau Explorers Ltd.**, which is also continuing its surface drilling, and similar action will be taken by **Merrill Island Mining Corp.**, which has raised funds for a 350-ft. opening to permit establishment of two levels.

Other companies are busy at surface work or diamond drilling. **Grandines Mines** has been securing good copper values with low gold assays and indications of molybdenum as well. **Quebec Chibougamau Goldfields** has completed a magnetometer survey on its 1,000-acre property, and **Jaculet Mines** has been drilling to clarify its complex geological picture.

★Production of **Anacon Lead Mines** made another new record in the opening quarter of 1952, with net value in excess of $1,030,000 and operating profit above $600,000.

★Good progress is being registered in the joint program of shaft-sinking and mill-building undertaken by **Montauban Mines** and **United Lead and Zinc Mines**, neighbors of Anacon in Portneuf County. Shaft bottom is close to 400 ft., with levels established at the 150 and 240-ft. horizons. All equipment for the 500-ton mill has been purchased, construction is well started, and completion is scheduled for early fall. Sufficient funds are on hand to assure financing.

★Construction of **Bevcourt Mines** 500-ton mill has been making excellent progress. A healthy new ore structure has been encountered on the 900-ft. level. First drifting showed length of 318 ft. with muck samples from 1,158 tons of development ore averaging 0.28 oz. gold per ton.

★An immediate start on construction of a 250-300 tons-per-diem concentrator at its Weedon Mine, 39 mi. northeast of the city of Sherbrooke in the Eastern Townships of Quebec is announced by Weedon Pyrite and Copper Corp., Ltd., Mont. It is anticipated that the Weedon property will be in production by early fall, 1952.

Reopened less than a year ago by the present company, a thorough sampling of the old workings confirmed the view that at least 200,000 tons of ore averaging from 30% to 35% sulphur and approximately 2% copper, plus at least 80,000 tons of considerably richer material in the pillars of used shafts.

★The railway being spiked and blasted from the St. Lawrence River into the iron country on the Labrador-Quebec boundary is now expected to reach completion by the end of 1953, to permit first iron ore shipments in 1954, a full year ahead of schedule.


**Roof Bolting Costs LESS – lasts LONGER**

*These roof bolts held while timber supports failed in similar service in the same mine.*

Roof bolting is accepted as improved practice in coal mines and is now under test in metal mines with apparent success. Already demonstrated are these advantages over timbering: improved efficiency, increased production, lower cost, greater safety, assured permanence, better clearance at walls and roof.

**CF&I offers roof bolts with flame-cut slots and serrated wedges. Test them; see how they meet your particular conditions.**

*Inserting the bolt* *Driving it home* *Tightening the nut*

a product of
THE CALIFORNIA WIRE CLOTH CORPORATION, OAKLAND
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WICKWIRE SPENCER STEEL DIVISION, NEW YORK

MINE ROOF SUPPORT BOLTS
THE COLORADO FUEL & IRON CORPORATION CF&I

The big bridge across the Moisie River (only big one on the 360-mi. route) was completed two months ago, and it is expected that 190 mi. of steel will have been laid by year-end. In the meantime, **Iron Ore Co. of Canada** is pressing exploration, and has set aside $2-million for prospecting during the current season. Most of it will be spent in the Labrador concession, which will have to be cut down from 18,000 to 1,000 sq. mi. at the end of 1953. The Quebec concession (being renewed this summer for five years with an additional five-year renewal option) doesn't present the same urgency.

## YUKON

★Hit by dry weather and an unsatisfactory labor situation, **Yukon Consolidated Gold Corp.** last year suffered a nearly 50% cut in net profits. Company reports estimated net for the year was $353,100, not counting government cost aid, compared with $829,695 in 1950.

The weather and labor situation resulted in higher costs and less production. Value of output in 1951 was $1,932,842, compared with $2,541,965 in 1950.

# IN AFRICA

★Output of gold from the **Orange Free State** for March was 15,323 oz.; and from the Transvaal, 966,238 oz.

★Output of gold from the **Kilo-Moto mines**, Belgian Congo's most important gold producer, was 624,623 grams bringing the total for the first three months of 1952 to 1,887,607 grams.

★**The drop in gold production** in Rhodesia to 486,907 oz. in 1951—24,256 oz. less than in 1950—was the cause of considerable concern to members of the Rhodesian Chamber of Mines. While the Chamber welcomed the news that the whole of the colony's gold output was to be sold on the free market, it was noted that the price had dropped, and is expected to drop still lower. Free market sales at the close of April were still yielding an additional 13s. per oz. The Minister of Mines said the government had been considering subsidizing the cost of labor capitation fees chargeable for the gold industry and food farmers.

★A borehole put down by the **President Brand Gold Mining** operations in the Orange Free State has yielded a basal reef core with a high gold value of 3,253 in.-dwt. The borehole cut the reef at a depth of 3,981 ft., having an average of 111.6 dwt. over a true width of 29.15 in.

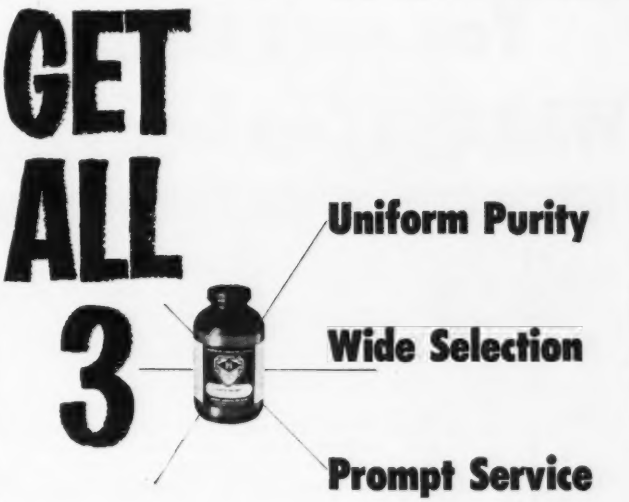
★**Northern Rhodesia's mineral production** for January, 1952 was valued at £5,977,120. Production included 16,121 tons of blister copper, 6,163 tons of electrolytic copper, 1,940 tons of zinc, 1,050 tons of lead, 2,132 cwt. cobalt alloy.

# IN AUSTRALIA

★The Commonwealth Bureau of Census and Statistics reports the following for the Australian gold mining industry in the year ended Dec. 1951: During 1951 the quantity of gold produced in Australia was 870,963 fine oz., an increase of only 0.2% compared with the previous year but still 47.1% below the Australian output of 1939. The highest postwar output was in 1947: 938,000 oz.

Employment figures for gold mining show that approximately 11,000 persons are now employed in the industry compared with 29,000 in 1939.

Employers in the gold and metalliferous mining industries have offered workers a margin wage increase of 10 and 12 shillings a week. These increases apply to special payment for skill in addition to the officially prescribed wages. The workers asked for 30 to 40 shillings a week increase. Conciliation Commissioner Donovan accepted the employers' figures. In his judgment he advocated the introduction of profit sharing schemes in the gold and metalliferous mining industries as a means of bringing about a greater production and indus-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## Australia *(Continued)*

trial peace. In the meantime some gold mines find it difficult to carry on production activities. Among recent closures was the Mountain View Gold N. L. at Day Dawn, Western Australia. Also closed is the Northern Star Gold Mines plant at Kevington, Victoria. It is hoped that this will be temporary.

★The Gold Producers' Association formed for the special purpose of marketing Australian gold in "Premium" markets has an initial membership of 460. All gold producers are accepted for membership and only those joining the Association are privileged to receive the premium amounts. Demand for "premium" priced gold of Australian origin has greatly improved and no more bargain sales were effected at rates of between U. S. $3 to $4.50 above the $35 per oz. rate.

## WESTERN AUSTRALIA

★**Lake View and Star Ltd.'s** development in last year rose from 17,500 ft. to 21,867 ft. and the ore reserves were estimated at over 4-million tons. Average working costs, excluding tailings retreatment, rose by over 15% and the extraction rate was 92.45%. Improved labor supply was responsible for the increased tonnage. Retreatment of residues during the year gave a new profit of over $130,000.

★**Central Noresman Gold Corp. N.L.** in the 10 months ended Feb. 1, 1952, milled 115,280 tons for 32,930 fine oz. of gold, an average yield of 5.71 dwt. a ton. In that period several rich developments were struck.

★**Output by King Island Scheelite Ltd.** for the month ended April 5 was slightly lower than the previous month. Production amounted to 77.81 tons of scheelite from 14,956 tons treated. The March figures were higher with 85.7 tons from 14,392 tons treated.

★There was also a drop in production figures for **Aberfoyle Tin N.L.** Only 13 tons wolfram concentrates were won in comparison with 17 tons in a previous period.

## NEW SOUTH WALES

★January figures for this state show production of gold 3356 fine oz.; copper 226 tons; silver 379,000 oz., but decreases in the production of zinc and cadmium. The latter was a rather small decrease.

★The dollar earning mineral sands industry in New South Wales had its value of output increased by 151% from 1950 to 1951. The production of rutile concentrates rose from 8,026 in 1949 to 23,060 tons in 1951. Zircon concentrates rose from 12,608 tons in 1949 to 32,281 tons in 1951.

## NORTHERN TERRITORY

★Wolfram Hill N.L. and Ora Banda North Gold Mines N.L. intend to make arrangements for early shaft sinking and development on their jointly owned lease. Good wolfram assays have been obtained, the grade being up to 10% wolfram.

★A new discovery of extremely rich and valuable deposits of bauxite has been made on the islands off the northeast coast of Arnhem Land, Northern Territory.

Deposits of lateritic materials containing a rich proportion of bauxite were discovered on Wessel Island and on Machinbar Island. Other neighboring islands will be searched for minerals in the near future.

★**Pioneer Scheelite** expects its mill to operate in December next. Ore production on a moderate scale has commenced.

Development work on the Mosquito Creek scheelite field shows it to be one from which a big tonnage of good economic ore is to be won by treating lodes from 30 to 36 in. wide. In addition, a large tonnage of alluvium and detrital material that will


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be treated economically at the new plant operated by Doria Central Scheelite and Territory Scheelite companies. At Central Scheelite present work and stoping operations can yield 100 tons of ore a week assaying 2% tungstic oxide.

★**Doria Gold Mines N.L.** reports that the 50 ft. level has cut lode with a full face of scheelite showing over 3 ft. with very high values concentrated in a quartz vein 7 in. wide.

# IN EUROPE

★**Italy's output of pyrites** reached the 900,000-ton mark in 1951 according to a report by the Montecatini Co. The Montecatini mines produced 776,000 tons of this total. The company's new mine on the Isola del Giglio started operating in August 1951, and is now producing about 1,600 tons monthly. Italy's output of raw sulphur in 1951 was 200,000 tons in 1951. National deliveries, drawing partly upon stocks, totaled 250,000 tons in 1951, 40% of which was exported.

★**Norway's production of graphite** will be increased 100% this year. The country's only producing mine, Skaland Grafittverk will double production this autumn from 3,500 to 7,000-8,000 tons. New machinery from the United States will be delivered in July.

★Mutual Security Agency has signed a contract with a Greek company, **Eleusis Bauxite Mines, SA,** calling for an advance of $120,000 to be used for the purchase of American equipment such as diamond drills, bulldozers, and compressors. The equivalent of $1,330,000 in Greek and German currencies will also be advanced for use by the Greek company as working capital, and for the purchase of German equipment. MSA said that the U.S. would be repaid with 100,000 tons of aluminum for stockpile. Under the contract the Greek company will deliver 450,000 tons of bauxite to Germany for refining where two companies will produce the aluminum for delivery to the U.S. stockpile.

★**Output of iron ore** from the Divigri mines in Turkey will be stepped up to 450,000 tons per year to supply ore for a second blast furnace scheduled to be completed in May at the Karabuk iron works.

★**Yugoslav bauxite exports** last year were 449,000 tons out of a total output of 453,000 tons. West Germany has been an important customer, and in the future will take more than 30,000 tons from the Istrian and Dalmatian mines. In exchange, Germany will supply Yugoslavia with mining equipment such as bulldozers, pumps, compressors, diesel units, and electrical equipment worth about 60-million dinars.

★World demand for **sulphur bearing ore** combined with the fact that the


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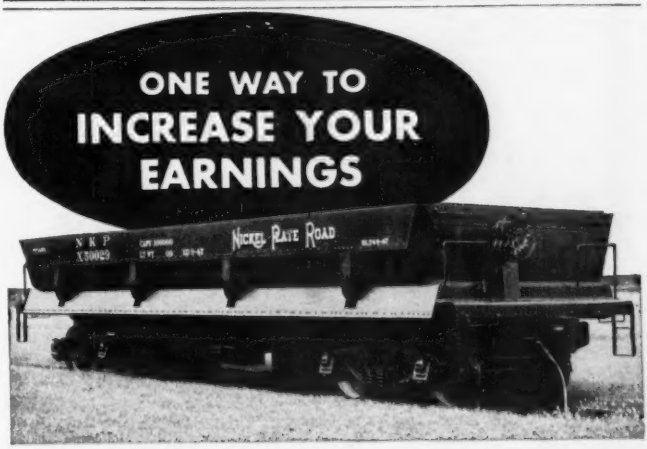


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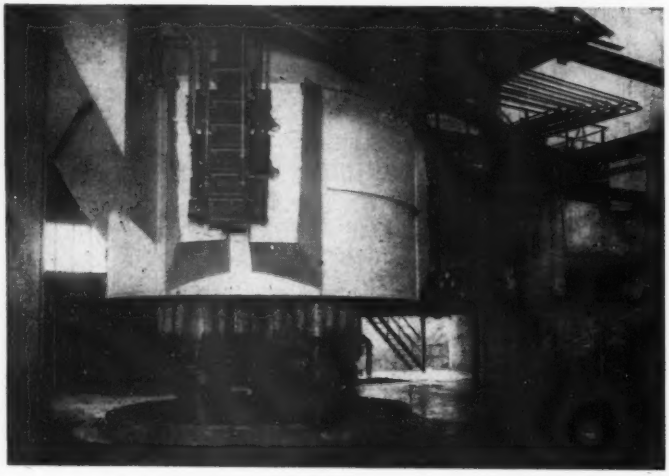

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## Europe *(Continued)*

Spanish Government has recently granted exporters of this valuable mineral some exchange facilities, have resulted in a boom in this country's pyrites production. Spain has the largest known reserves of iron pyrites in the world. Her actual reserves are estimated at 273-million metric tons, or 56% of the world's reserves.

Spain's iron pyrites zone, which measures some 70 mi. long by 18 mi. wide, is in the southern province of Huelva. The trend of the deposits is generally east-west extending into Portugal.

Twelve mining companies, of which five are foreign owned, operate within this area. The largest company is "Rio Tinto Ltd.," closely followed by "Tharsis Sulphur and Copper Ltd.," both British owned and operated since 1873. Together, these companies produce 85% of Spain's pyrites. Of this 85%, Rio Tinto produces two-thirds and also handles export operations for Tharsis. Rio Tinto owns and operates a 53-mi. stretch of railroad linking the mine-fields to the port of Huelva.

In 1951 Spain's export figure for iron pyrites totaled 1,535,755 metric tons, showing an increase of 26.1% over the previous year.

Her biggest buyer was West Germany absorbing 29.1% of the total output, followed by the United Kingdom with 17.3%, Belgium-Luxembourg with 14.9% and the Netherlands with 13.8%. Early in 1951 the United States received 1,017 metric tons.

★**A new aluminum plant** is now being built in the Spanish Mediterranean port of Alicante. Machinery for the factory called "Aluminio Iberico" is being manufactured locally using U.S. and Canadian patents. The company will produce high-tension aluminum-steel cables, all-metal railway cars of aluminum, and aluminum alloys.

★**Pechiney**, important chemical and electro-chemical group which produced 80% of France's aluminum has now completed a group of 100,000-amp. vats, thus considerably increasing its capacity and lowering production costs. Production in 1951 was 74,791 tons. If sufficient hydroelectric power becomes available output might reach 100,000 tons per year.

★Plans for modernizing plant and methods of producing **phosphate in French overseas territories** are expected to increase North African production from 7-million tons in 1951 to an estimated 8-million tons in 1952.

# IN LATIN AMERICA

★Mexican mining products will be strictly withheld from shipment to Russia and Iron Curtain countries according to Luis Latapi, director general of Credito Minero y Mercantil, S.A., when asked whether Mexico and

Russia are about to barter metals and minerals for machinery and other products.

★1951 mining production in Mexico totaled $277-million in value. Iron production was 312,580 tons; silver, 1,362.262 kilograms; and gold, 12,237 kilograms.

★A port and ore-handling wharves are to be built on the Michoacan Pacific Coast to service the Las Truchas iron deposits.

★Promising nickel, tungsten, and molybdenum deposits have been reported by prospectors searching on the Cerro de Tehuatla, a hill in Puebla. Government officials are checking the reported discoveries.

★A fair amount of sulphur will be available for export soon according to the Ministry of National Economy Sulphur Control Commission. Petroleos Mexicanos (Pemex) expects to increase production. The Pemex plant produced 125 tons daily during January, and Minera de Azufre, 35 tons.

★Japanese industrialists are seeking iron ore in Colima State where deposits of 70 to 100-million tons are known to exist.

★Gold was placed under official control by a presidential decree requiring all producers, buyers, sellers, and traders in metallurgical and mineral products containing gold to report monthly to the Federal Tax Department stating how much fine gold they produce or handle.

★The steelworks and tube plant to be built in Brazil by Mannesmann of Dusseldorf in conjunction with Brazilian interests is projected for an investment of only $160 per ton of capacity compared with $220 per ton at the Delaware River Fairless Works, according to a statement by the new company.

The company, Mannex do Brasil S.A., has been organized with a total capital of Crs. 400-million (U. S. $20-million) of which the equivalent of U. S. $15.5-million will be spent on plant and equipment. Mannesmann will hold 52.5% of the stock, and will supply all the equipment for the works which are to be located outside the city of Belo Horizonte, Minas Gerais state capital.

There will be five units in the plant. A pig iron plant equipped with two Niederschaft electric furnaces; a steel plant consisting of two electric furnaces, a Siemens Martin furnace and two converters; an extrusion mill for steel pipe from ⅜ to 3-in. dia.; a Stiefel rolling mill for pipes 3-in. to 8-in. in dia.; and a rolling mill for wire, strip, and profile iron. Production is scheduled for 1955.

★The appointment of a new Minister of Economy and Labor in the Cabinet of President Jacobo Arbenz has raised some hopes in business circles that the ultra-nationalists and leftwing elements in Guatemala that have been


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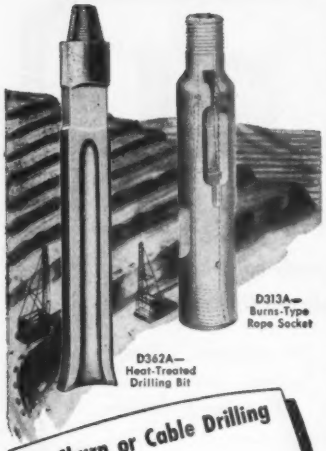


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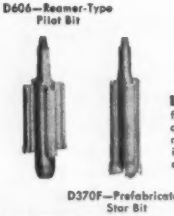


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## Latin America *(Continued)*

influencing Arbenz may be losing ground.

His appointment of Roberto Fanjul as minister was also greeted with considerable relief by foreign investors in this country. Fanjul was described by the government-controlled press as a "modern, liberal, capitalist."

The fact is, the new minister is a highly successful businessman whose interests extend into the fields of mining, insurance, finance, and coffee exporting. He is the only minister in the Arbenz Cabinet who has been successful outside of the government and who is very definitely making a financial sacrifice to serve his country.

Minister Fanjul made it clear to McGraw-Hill World News that he feels strongly that Guatemala needs foreign investments if it is ever going to be able to develop its natural resources, which include mineral deposits, petroleum, timber, and agricultural. He added that he intends to make every effort to encourage the influx of U. S. and other foreign capital and would recommend changes in any laws that presently are considered inoperative by foreign investors.

United States interests here, which total an investment of at least $200-million, and include the International Railway of Central America, United Fruit Co., Hoover Mining interests, Electric Bond and Share Corp. and Pan American Airways, have adopted a "wait-and-see" attitude.

As one representative of a very substantial U. S. investment here pointed out, Fanjul's predecessor, Dr. Manuel Noriega Morales, who is a conservative economist of international repute, expressed the same intentions when he took over the ministry a year ago March. But he only lasted one year and little if anything constructive was accomplished.

# IN THE PHILIPPINES

★The **Paracale mining district** is making a comeback after 11 years of complete shutdown of the mines following invasion by the Japanese in 1941. San Mauricio, United Paracale, and Coco Grove, all Marsman-controlled gold mines, are actively working and San Mauricio has started milling. Santa Barbara and Paracale Gumaus are being rehabilitated. United Paracale is unwatering the Longos shaft where a heavy waterflow has been encountered. The shaft has been repaired to the 300 level and it is hoped to reach the 500 level before long. In the meantime, production will begin from the Baluarte Shaft. Plans call for production at a rate of 300 tons per day. It is estimated that when full output is attained the mine will produce 43,000 oz. of gold, 82,500 oz. of silver, 800,000 lb.


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of copper, 600,000 lb. of lead, and 800,000 lb. of zinc per year. Gross value of the production at today's prices, including sale of the gold at premium prices, would be about $2,700,000 per year. Ore reserves total 249,612 tons averaging $15 per ton at the statutory price of gold. Overall operating costs may average about $14 per ton. Any substantial profit will evidently depend upon securing the present gold premium.

★The **Hixbar copper mine** on Rapu-Rapu Island is being worked again by former operators. The ore is low grade and must be concentrated. In prewar years it was shipped as mined to Japanese smelters. The ore carries a heavy pyrite content and efforts are being made to utilize it for manufacture of sulphuric acid to make fertilizer for which there is a heavy demand in the Philippines.

★**Marinduque Island** has a promising new iron mine, now shipping about 4,000 tons a month to Japan. Known as the Pili property, the ore averages about 55% iron. It is estimated that about 500,000 tons are in sight from the limited development work done.

★An excellent demand exists for **Philippine chromite.** Consolidated Mines, operated by Benguet Consolidated on a profit-sharing basis, shipped 33,200 tons of refractory grade chromite ore in March, valued at nearly $500,000 fob shipping port. It is expected to raise shipments to over 40,000 tons a month. The new Acoje mill is in operation, recovering metallurgical grade chromite. This ore has been bringing $37 per ton f.o.b. Cebu. Lower grade ore averaging 41% $Cr_2O_3$ sells for $26. Japanese buyers are actively competing for the ore.

★**Gold prices** in the Manila open market have been sliding since the first of the year and in April had fallen to 107 pesos per oz., for refined gold, a decline of about 20 pesos since January. Bullion sold at 105 pesos at the same time. In Hong Kong it sold at $46 per oz., indicating the depreciation of the peso with respect to the dollar.

★During 1951 tonnage mined and milled at **Mindinao Mother Lode** reached an all-time high of 119,800 tons, valued at $1,970,000 at the statutory price. Average grade of ore was 0.47 oz. per ton. Gold recovery for the year was 92.1%. Three separate concentrates were made, one of copper-gold-silver, one of lead-gold-silver, and one of pyrite-gold-silver. Ore reserves on Jan. 1, 1952 were 189,229 tons valued at $3,691,000. New ore developed during the year averaged 0.45 oz. gold per ton. Production costs in 1951, including mine, products tax and administrative and general expense averaged 29 pesos per ton. The management observes that the entire profit in 1951 depended upon the premium received from sale of 75% of the gold production in the open market. This premium, it is added, is an uncertain and unstable factor.


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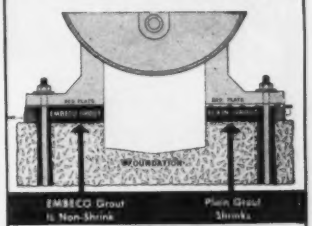


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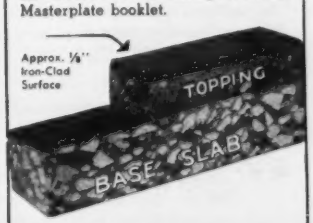


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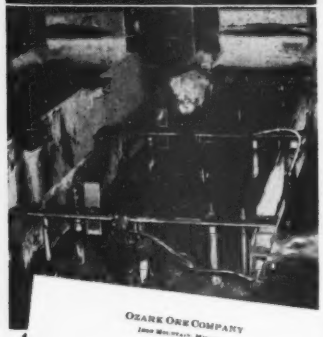

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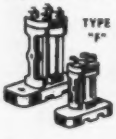

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*(Continued from page 87)*

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4. Reduction from an ammoniacal solution in an autoclave.
5. Precipitation of cobalt-nickel powder. The powder contains 95% cobalt and 5% nickel, and is to be sold as such. Cobalt could be separated from nickel, and would be if there were a penalty against the 95%-cobalt product.
6. Recovery of ammonium sulphate from the metal-barren solution.

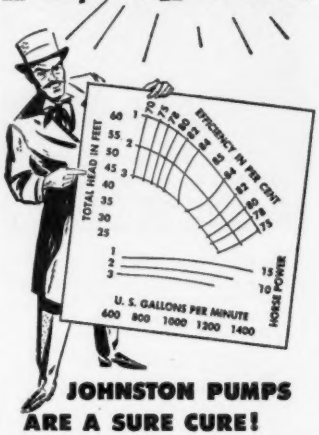
## National Lead's Plant

Also under construction at Fredericktown, Mo., for National Lead Co. is a $5-million refinery which is scheduled for completion in mid-1953. With a designed capacity of 50 tons of concentrate per day, the plant is expected to maintain an annual production of 700 tons of cobalt, 900 tons of nickel, 700 tons of copper, and also 7,500 tons of fertilizer-grade ammonium sulphate.

## Sherritt's Ammonia Leach

A unique development is the $17-million nickel refinery now under construction for Sherritt Gordon Mines Ltd. at Edmonton, Alta. There, the Sherritt Gordon ammonia-leach process and Chemico's nickel reduction process are combined. The plant, scheduled to begin operation in the Fall of 1953, will turn out mostly nickel and small quantities of cobalt and copper from sulphide ores mined at Sherritt Gordon's Lynn Lake holdings at Manitoba. Annual production at the refinery is expected to be about 8,500 tons of nickel, 1,000 tons of copper and 150 tons of cobalt, plus 70,000 tons of ammonium sulphate.


# *Suffering from* Horsepower Headaches?




## JOHNSTON PUMPS ARE A SURE CURE!

Don't blow a fuse because you are overloaded with pumping troubles. The steep head-capacity and flat horsepower characteristics of Johnston Vertical Turbine Pumps prevent overloading of the motor regardless of fluctuations in capacity or head. Low starting torque requires less horsepower and results in higher efficiency and longer life of the motor.

**The Treatment Is Painless**

Every Johnston Pump is engineered for the specific duty for which it is intended. Trained hydraulic engineers are available at your nearest Johnston dealer or at the Johnston factory to furnish detailed information, proposals and anything else necessary to cure your particular pumping malady.

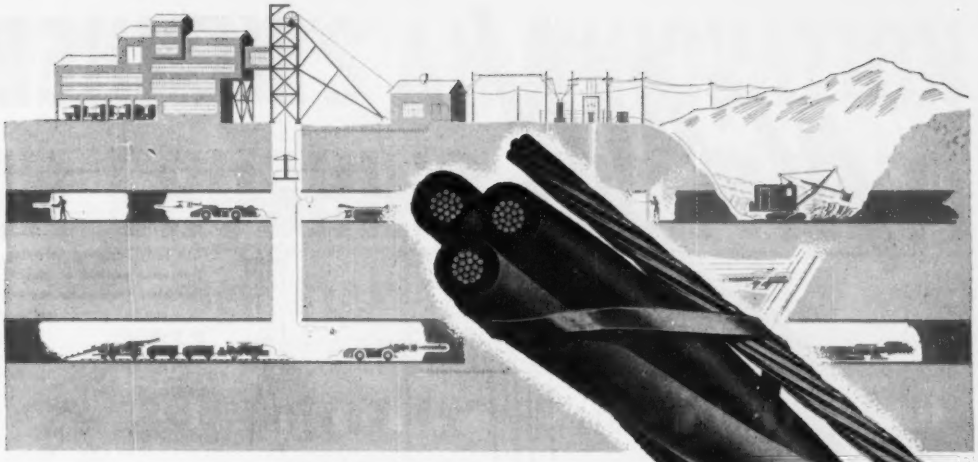
**The Johnston Wonder Drug**

Johnston Turbine Pumps are ideally suited for industrial and municipal applications because of their non-overloading characteristics, simplicity of construction, compactness, ease of installation, elimination of priming, low starting torque, capacity adjustment features and minimum maintenance costs.

***Free diagnosis!***

**No matter what your pumping job, contact your nearby Johnston Dealer or write the factory direct for a free diagnosis of your pumping headaches.**

**JOHNSTON PUMP COMPANY**
**3272 EAST FOOTHILL BLVD., PASADENA 8, CALIF.**
*Headquarters for Vertical Turbine, Mixflow and Propeller Pumps Since 1909*



## *safe . . . compact . . .*
## *low cost . . . easy to install . . .*

# HAZARD SELF-SUPPORTING CABLE
## FOR POWER TRANSMISSION

**Versatile . . . that's Hazard-Self Supporting Cable for power transmission in and around the mine. Its "all-in-one" construction (preassembled cable, messenger and binder) requires a minimum of space, makes it easy and quick to install . . . simple to relocate. And it can be furnished with Hazard's reverse-lay design which permits spreading of the conductors for easy tapping anywhere along the cable.**

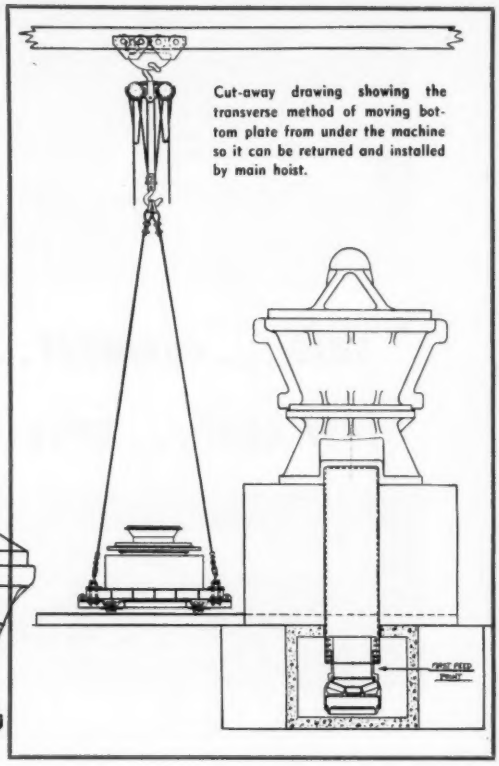
**Because of these advantages, it is an ideal cable for overhead suspensions between buildings and shaft structures, carrying power through heavily wooded areas, and for side wall or roof suspensions in underground slopes and entries. For all power transmission lines, Hazard Self-Supporting Cable is engineered and constructed to give extra long life under the severest mine operating conditions.**

**Hazard Self-Supporting Cable is insulated with Watertite heat and moisture resistant insulation and protected by Hazard's famous Hazaprene ZBF sheath. This smooth, abrasion-resistant covering possesses maximum density and lasting toughness to stand up against weather and destructive mine water. In addition, Hazaprene ZBF sheath more than meets the requirements of the Federal Bureau of Mines and the Pennsylvania Department of Mines for flame resistance.**

**For complete information on this versatile power transmission cable see your Hazard representative or write Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pa.**

**HAZARD** wires and cables for every mining use

# AGAIN... KENNEDY



Cut-away drawing showing the transverse method of moving bottom plate from under the machine so it can be returned and installed by main hoist.

Please observe that the hoist for erecting the crusher is also used to raise and lower the bottom plates with wire ropes. Undependable operation of hydraulic jacks eliminated and crusher erected in 10 minutes by this method.

The reinforced concrete floor acts as a screen to prevent any dust from getting into moving parts of crusher or motor.

Exhaust, carrying air to remote points.

# PRESENTS AN INNOVATION IN CRUSHING EQUIPMENT!

## NEW GYRATORY CRUSHER WITH DUAL DISCHARGE OUTLETS INCREASES OUTPUT AND EFFICIENCY

Only KENNEDY has the correct answer to the "Sticky Ore" problem! KENNEDY Gearless Gyratory Crushers are now built with TWO DISCHARGE OUTLETS plus an exclusive "No-Stick" feature that increases efficiency and output. This distinct innovation in crusher design is another "FIRST" for the world-famous line of KENNEDY crushing equipment.

**CHECK THESE EXCLUSIVE FEATURES**

Synchronous motor built into pulley assembly

★

Smooth frictionless operation because the crusher is gearless

★

Power used ONLY for crushing

★

All moving parts carried on self-aligning roller bearings

★

KVS forced-feed oiling system pumps four barrels of oil per hour through bearings without waste

★

Eccentric and ball are spray babbited. NONE has been rebabbited in over three years

Hard-to-crush rock and ore such as limestone, trap rock, basalt, taconite, slag, etc., containing as high as 50% clay, can be handled without sticking or clogging by the exclusive KVS process.

No other crusher offers this advantage. Double discharge outlets, built at angle of 70 degrees, assure uninterrupted delivery of material. Other crushers, with single 42 degree outlets, cannot compare because the discharge outlet becomes clogged with sticky clay or taconite ore.

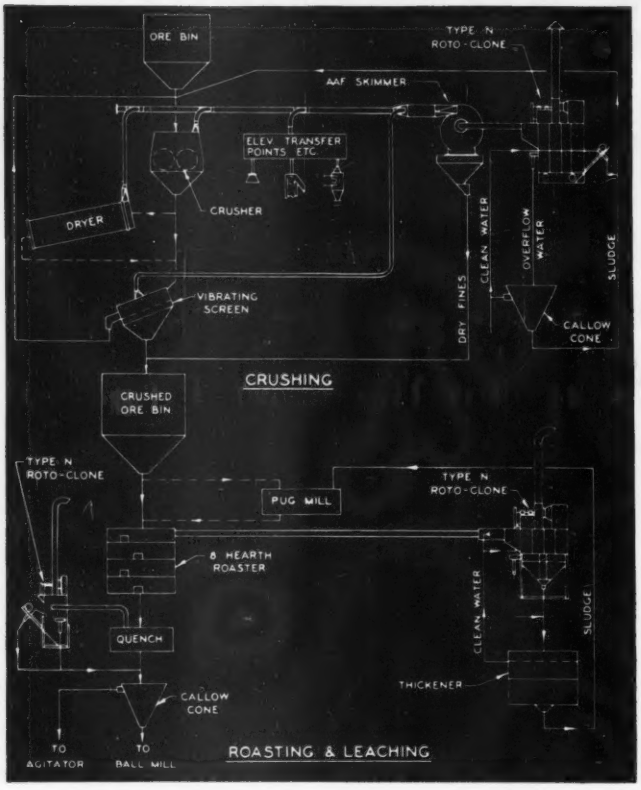
In the new KVS crushers, rock and ore pass through mantle and concaves at bottom. A vertical drop of 6 feet then quickly and surely disgorges sticky clay, etc.—greatly speeds production by eliminating clogging —saves countless man hours clearing stalled crushers.

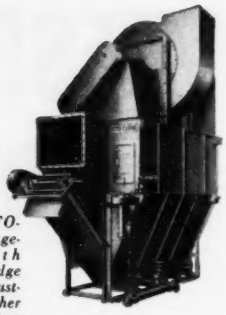
***Send for bulletins describing all types of KVS crushers.***
***Let us prove that "It Costs Less To Own The Best".***

**IT COSTS LESS.. TO OWN THE BEST!**

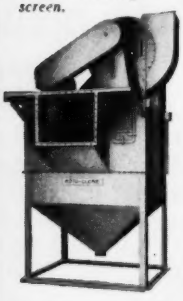
**KENNEDY-VAN SAUN**
**MANUFACTURING & ENGINEERING CORPORATION**
TWO PARK AVENUE, NEW YORK
FACTORY DANVILLE, PA.

# for uranium beneficiation

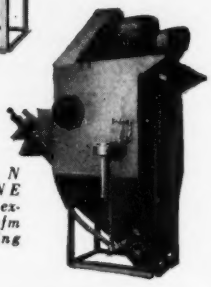


*Type N ROTO-CLONE Arrangement C with automatic sludge ejector, exhausting dryer, crusher and vibrating screen.*



*No. 16 Type N ROTO-CLONE Arrangement D continuous sluicing of sludge exhausting roaster.*



*No. 2½ Type N ROTO-CLONE Arrangement C exhausts 2,500 cfm from quenching operation.*

# ROTO-CLONE DUST CONTROL

***ROTO-CLONE Engineered Dust Control adapted to new milling process increases efficiency and uranium production.***

In reactivating a large uranium mill, a new process was developed for continuous leaching of carnotite ores to replace an inefficient batch leaching technique. However, dust was a problem. Excessive amounts could not be tolerated, if several operations in the cycle were to maintain highest efficiency. This was particularly true of the roaster feed. Also, samples of fine dust showed it carried 4 to 7 times more uranium values than the run of ore.

ROTO-CLONE engineered dust control proved the efficient solution to both problems. It eliminated dust produced by critical operations, and also permitted recovery of the high value fines. In this application the salvage value of the collected material was an extra dividend.

The many types, sizes and arrangements of ROTO-CLONE provide practical answers for most dust control problems. Write us today for Engineering Bulletin No. 277 which contains essential information and application data.

**American Air Filter**
**COMPANY, INC.**
**193 Central Avenue, Louisville 8, Ky.**
American Air Filter of Canada, Ltd., Montreal, P.Q. • Pacific Division Office, San Francisco, California

# THE BIGGER THE JOB THE MORE YOU SAVE

**BARBER-GREENE**

**MODEL 76** PERMANENT BELT CONVEYORS

**SAVE** SELECTION ENGINEERING ERECTION **TIME ... AND MONEY**

Barber-Greene Conveyors are made of pre-engineered, self-contained, *standardized* units that are quickly assembled without costly engineering time. Field assembly of miscellaneous pulleys, bearings and dozens of other parts is completely eliminated. B-G Conveyors are as easily disassembled, expanded or relocated—with 100% salvage. The value of these B-G features is in direct proportion to the size and scope of the conveying job. The bigger the job—the more you will save. Wherever you have bulk handling problems—or are planning to modernize or expand present facilities—investigate Barber-Greene Conveyors. Take advantage of Barber-Greene's extensive experience in solving problems of bulk handling similar to your own. Complete descriptive data is available for handy reference—it's yours for the asking.

## Barber—Greene

**AURORA, ILLINOIS**

# It's time we got *working* mad!

As we listen to the latest insults from Moscow, we're likely to get fighting mad.

Instead, we'd better use our heads and get *working* mad.

It is clear by now that Stalin and his gang respect just one thing—strength. Behind the Iron Curtain they've been building a huge fighting machine while we were reducing ours. Now we must rebuild our defenses—*fast.*

As things stand today, there is just *one* way to prevent World War III. That is to re-arm—to become strong—and to stay that way!

This calls for better productivity all along the line. Not just in making guns, tanks and planes, but in turning out civilian goods, too.

Arms must come first. But we must produce arms *at the same time* we produce civilian goods.

We can do this double job if we all work together to turn out more for every hour we work—if we use our ingenuity to step up productivity.

All of us must now make sacrifices for the common good. But we're working for the biggest reward of all —*peace with freedom!*

**THE BETTER WE PRODUCE THE STRONGER WE GROW**

A PUBLIC SERVICE PROJECT ★ THE ADVERTISING COUNCIL ★

**FOR A FREE COPY OF "THE MIRACLE OF AMERICA"**

MAIL THE COUPON to Public Policy Committee, The Advertising Council, Inc., Dept. B.P., 25 West 45th Street, New York 19, N. Y.

*Name* .....

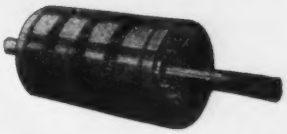
*Address* .....

.....

# Which Answers Your Tramp Iron Problem BEST?

## MAGNETIC PULLEYS

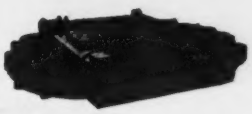
Powerful, air cooled electro magnetic pulleys are ideal where well loaded conveyor belts are used. Installed as head drive pulley, tramp iron is discharged automatically. Low operating cost, long life and extreme power characterize this workhouse of the Dings line. Catalog C-1001A tells you why this magnet is exceptionally efficient.



Dings *non-electric, self-energized* Perma Pulley magnets are recommended where burden depths do not exceed 3". Within this range, these are the magnets to use because of their unsurpassed concentration of magnetic strength near the surface. Catalog C-1007A.

## SUSPENDED RECTANGULAR

Power close and power that searches down as deep as 30" to yank tramp iron out. If the Dings RM rectangular won't do it, it can't be done. Triple pole, double gap design. Install horizontally, vertically or at an angle above belt conveyors or in chutes. Self-cleaning fully automatic models also available. Write for details.



## MAGNETIC DETECTOR

The Dings Magnetic Detector instantly signals when any magnetic object large enough to be damaging passes through the detector zone. Can be hooked up to sound an alarm and stop the belt. Ideal protection for crushers, grinders, pulverizers, etc., where belt speeds are so excessive or burden depths so great no magnetic separator can function successfully. Detectors are available for belt widths from 18" to 72". Two types are available. One employs an electro magnet and the other, a permanent magnet. Performance of the two is comparable.

**Magnets shown here are available in size ranges for most applications. Special magnets can be made for any application. Write today for recommendations.**

**DINGS MAGNETIC SEPARATOR CO.**
**4716 W. Electric Ave., Milwaukee 46, Wis.**

Dings Certified

...A SIZE TO FIT EVERY NEED
...TO MEET SPECIFICATIONS

Pressure Vessels
Forgings and Rings
Hardened and Ground Steel Rolls
Corrosion and Heat Resisting Castings
Ordnance and Armor

Measurement is only one type of precision in Midvale rings. The steel for every ring is made by Midvale—physical properties are precisely maintained throughout every step. The shaping and heat treating of Midvale rings are done by "old-hands"—craftsmen with years of experience who precisely machine and test with the most modern metal working and scientific equipment.

Result—rings precision-made in every detail . . . rings that stand the severest abrasive, crushing and grinding action called for by industry.

Whatever your needs for heavy equipment in industry Midvale can assure you of precision and performance. Whether it is roll shells for the mining and cement industry . . . pressure vessels for the chemical and petroleum industries . . . rolls for the paper industry . . . rings for turbines and gears . . . or castings and forgings for any industry . . . Midvale can make them to your most exacting specifications.

THE MIDVALE COMPANY
NICETOWN, PHILADELPHIA, PENNA.
OFFICES: NEW YORK • CHICAGO • PITTSBURGH
WASHINGTON • CLEVELAND • SAN FRANCISCO

MIDVALE
Custom Steel Makers to Industry
PRODUCERS OF FORGINGS, ROLLS, RINGS, CORROSION AND HEAT RESISTING CASTINGS

# *Choose between them and get 30% to 100% more air*

Coppus Blowers are designed for two different types of mine ventilation requirements: the centrifugal Coppus VENTAIR is for long pipe lines; the propeller-type Coppus VANO for shorter lines . . . the correct selection will give you from ⅓ more to twice as much air — for a given power consumption — than an ordinary all-purpose fan.

Available for either compressed air or electric motor drive, both can be used as blowers or exhausters and are obtainable in capacities up to 90,000 CFM.

*Only Coppus makes both these types,* one of which will give you better, more economical mine ventilation . . . know them by the "Blue Ribbon" that symbolizes the engineering and production skill behind every Coppus product.

› *Representatives listed in MINING CATALOGS. Other Coppus "Blue Ribbon" products: steam turbines, gas burners, heat killers, air filters, blowers and exhausters for special purposes. See also THOMAS' REGISTER . . . Coppus Engineering Corporation, Worcester 2, Mass.*

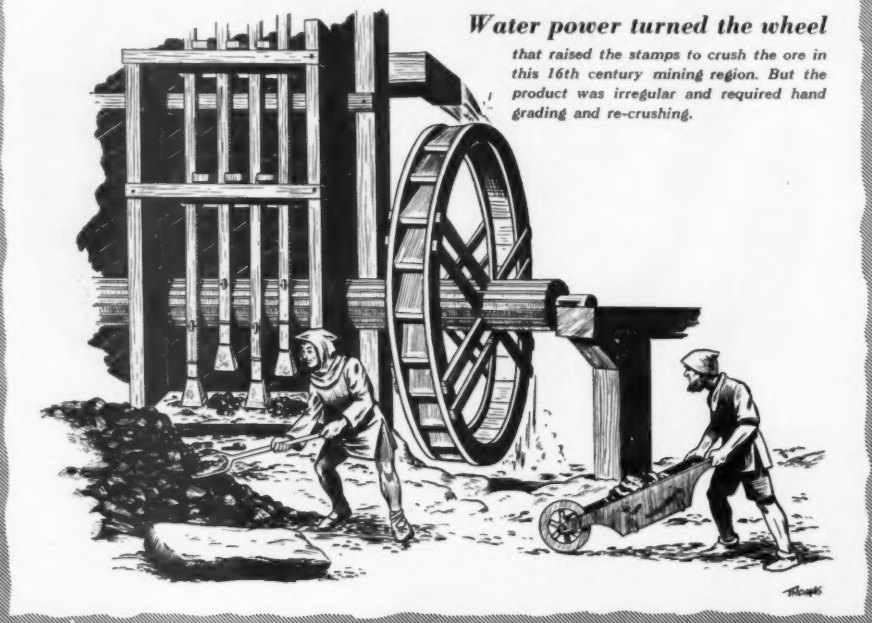
**COPPUS ENGINEERING CORPORATION**
286 Park Avenue, Worcester 2, Mass.

Please send.....Bulletin 130

Name.....

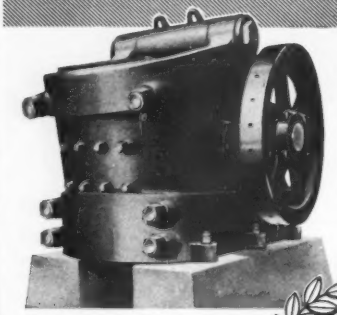
Company.....

Address.....



*Water power turned the wheel*

*that raised the stamps to crush the ore in this 16th century mining region. But the product was irregular and required hand grading and re-crushing.*



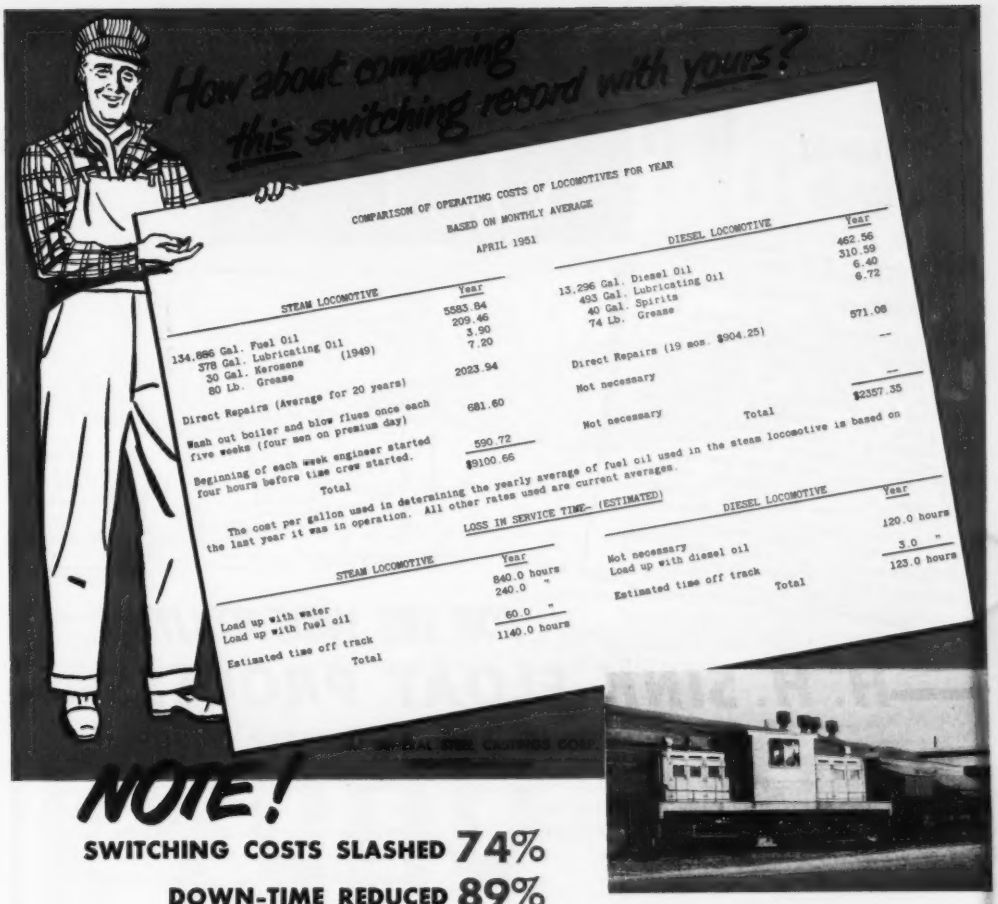
The Traylor Type R Crusher features smooth faced, curved jaw plates to assure a finer product in greater capacity. See Bulletin 1123 for construction details.

**Necessity** has always been the mother of invention. As new mining processes were developed, they created a demand for better, more efficient machinery. For 50 years, Traylor has accepted this challenge by leading in the development of advanced equipment for the mining industry. Now, and in the future, mining men can depend on this back-log of experience to supply them with the machinery they need. For Traylor has experience . . . half a century of it.

**TRAYLOR ENGINEERING & MANUFACTURING CO.**
**482 MILL ST., ALLENTOWN, PA.**
SALES OFFICES: New York, Chicago, Los Angeles, San Francisco
Canadian Mfr.: Canadian Vickers, Ltd., Montreal, P. Q.

OUR GOLDEN ANNIVERSARY YEAR
1902 1952

*a* **Traylor** *leads to greater profits*


How about comparing this switching record with yours?
COMPARISON OF OPERATING COSTS OF LOCOMOTIVES FOR YEAR
BASED ON MONTHLY AVERAGE
APRIL 1951
STEAM LOCOMOTIVE
Year
134,886 Gal. Fuel Oil 5583.84
378 Gal. Lubricating Oil (1949) 209.46
30 Gal. Kerosene 3.90
80 Lb. Grease 7.20
Direct Repairs (Average for 20 years) 2023.94
Wash out boiler and blow flues once each five weeks (four men on premium day) 681.60
Beginning of each week engineer started four hours before time crew started. 590.72
Total $9100.66
DIESEL LOCOMOTIVE
Year
13,296 Gal. Diesel Oil 462.56
493 Gal. Lubricating Oil 310.59
40 Gal. Spirits 6.40
74 Lb. Grease 6.72
Direct Repairs (19 mos. $904.25) 571.08
Not necessary —
Not necessary —
Total $2357.35
The cost per gallon used in determining the yearly average of fuel oil used in the steam locomotive is based on the last year it was in operation. All other rates used are current averages.
LOSS IN SERVICE TIME (ESTIMATED)
STEAM LOCOMOTIVE
Year
Load up with water 840.0 hours
Load up with fuel oil 240.0 "
Estimated time off track 60.0 "
Total 1140.0 hours
DIESEL LOCOMOTIVE
Year
Not necessary —
Load up with diesel oil 120.0 hours
Estimated time off track 3.0 "
Total 123.0 hours

# NOTE!

## SWITCHING COSTS SLASHED 74%

## DOWN-TIME REDUCED 89%

Annual cash savings in the switching operation at General Steel Castings Corporation up $7000! Availability of the locomotive increased a thousand hours annually!

Money-saving records like these, plus cleanliness, employee comfort and satisfaction, operating flexibility and other advantages of modern motive power, account for the growing popularity of Baldwin Diesel-Electric Locomotives.

With material and labor costs on the increase, management today is seeking every available means to introduce new operating economies. In your case, perhaps, a new Baldwin may partly solve the problem of mounting costs. When may we talk to you about your locomotive needs?

## LOCOMOTIVES

*for every industrial need!*

Baldwin builds a complete line of locomotives from 5 tons to 6400 hp road units—including three types particularly suitable to industrial switching. These are Diesel-hydraulic locomotives from 12 to 35 tons, Diesel-electric locomotives from 25 to 95 tons, and Diesel-mechanical locomotives in 5 and 8 tons.

If you are interested in more efficient switching operations . . . write today! We will be glad to analyze your problem—select the locomotive best suited to your specific needs.

**BALDWIN-LIMA-HAMILTON CORPORATION**
Philadelphia 42, Pa.
Offices in Principal Cities

**BALDWIN-Westinghouse**

DIESEL-ELECTRIC LOCOMOTIVES

# Now— Less Stringent Controls

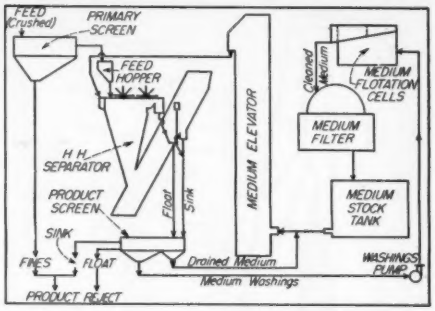
# H H SINK FLOAT Process

**Less Stringent Controls Work at Sullivan Sink-Float Plant**

OPERATION WITH LESS stringent controls than had been thought necessary has been found possible at Sullivan's sink-float plant, H. R. Banks states. This has permitted such changes as going from double to single-deck screening for the preparation screens. This is peculiar to the Sullivan.

"The Sink and Float process with ease of control through medium changes," says Mr. Banks, "offers an excellent tool for concentration where a sufficient margin exists between concentrates and tailing and where the values are segregated in ore particles down to, say, 10-mesh."

*March, 1952, E.&M.J. from data furnished by The Consolidated Mining and Smelting Company of Canada, Ltd.*




## FOR THE WIDE UTILITY

# H. H. SINK FLOAT PROCESS

### PRE-ENGINEERED • PRE-FABRICATED

Recent developments in this widely-used ore separation process, have resulted in increases in metal recoveries, reduced concentration costs, savings in man-hours and increase in metal reserves.

Other advantages realized through the H. H. Sink Float Process include:

- . . . ability to make closer separation on difficult feeds
- . . . positive control of separation density
- . . . positive removal of float product
- . . . positive removal of sink product
- . . . less power required for operation
- . . . ability to treat coarser sizes
- . . . easier to start after shut-down
- . . . easy to run . . . any mill operator can run it
- . . . low first cost per ton treated

Additional features of this process are:

- . . . rejects coarse waste without grinding it
- . . . produces coarse market concentrate
- . . . permits non-selective mining
- . . . treats metallics as well as non-metallics
- . . . treats mine ores, dumps, fill, development ore
- . . . serves existing and new installations

The H. H. Sink Float Plants are pre-engineered and pre-fabricated with economy in time and construction costs.

It will be to your advantage to explore the possibility of the H. H. Sink Float Process. Let us give you the names of plants now operating this process. Write for further information today.

SINK FLOAT
H H SINK FLOAT PROCESS

**THE SINK AND FLOAT DIVISION**
C. TENNANT, SONS & CO., OF NEW YORK
100 PARK AVENUE NEW YORK 17, N. Y.

# KYSOR teams with HOUGH in famous PAYLOADER® PERFORMANCE!

Positive control of engine operating temperature with KYSOR Shutters, joins HOUGH'S excellent engineering to increase efficiency, lengthen engine life and slash maintenance on the versatile and rugged HOUGH "PAYLOADER."

Wherever engines work, KYSOR Automatic Shutters furnish positive control of operating temperature the year 'round . . . in blazing desert or subzero winter blasts.

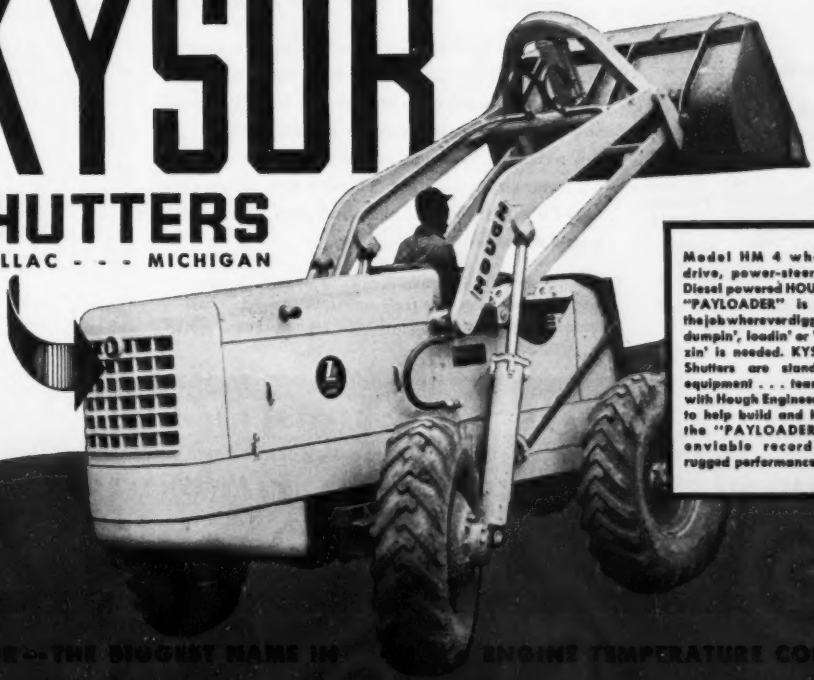
Whether it's moving earth, ore, grading, hauling, 'dozing or digging, you'll find KYSOR lined up on the side of *savings* . . . in maintenance and fuel (up to 12%).

KYSOR Automatic Shutters are engineered for all types of gasoline and Diesel engines . . . in trucks, stationary engines . . . from heavy duty giants to light pickups. If engines work for you, learn the KYSOR Story . . . be Wiser with KYSOR!

# KYSOR

## SHUTTERS

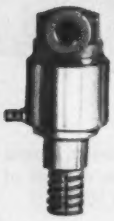
CADILLAC - - - MICHIGAN



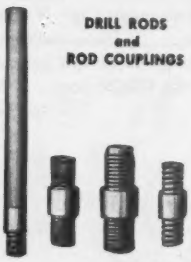

**Model HM 4 wheel drive, power-steered, Diesel powered HOUGH "PAYLOADER" is on the job wherever diggin', dumpin', loadin' or 'dozin' is needed. KYSOR Shutters are standard equipment . . . teamed with Hough Engineering to help build and hold the "PAYLOADER'S" enviable record of rugged performance.**

KYSOR—THE BIGGEST NAME IN ENGINE TEMPERATURE CONTROLS

# For DIAMOND DRILLING SUPPLIES
## ...depend on Longyear



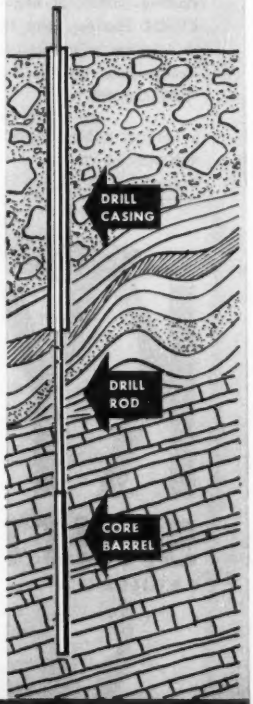
WATER SWIVELS



DRILL RODS and ROD COUPLINGS

DIAMOND BITS and REAMING SHELLS

SAFETY CLAMPS




TRIED AND PROVEN FEATURES, developed through extensive field experience, are continually being incorporated into all Longyear drilling supplies. Whatever your requirements—core barrels or water swivels, drill rods or safety clamps—you can depend on getting the best when you specify . . .

**Longyear DRILLING SUPPLIES**

- Bits
- Casing
- Core Barrels
- Core Lifters
- Core Splitters
- Deflecting Wedges
- Drill Hole Surveying Instruments
- Drill Rods
- Fishing Tools
- Hoisting Plugs
- Pressure Packers
- Safety Clamps
- Sampling Equipment
- Water Swivels

YOU CAN DEPEND, TOO, on getting the best of diamond bits promptly from Longyear's complete stock of standard core bits, casing bits and shoes and reaming shells. Selected stones, carefully set for maximum efficiency assure you of bits that will cut faster and last longer. Thereby you reduce your over-all costs. Special diamond bits can be obtained on order.

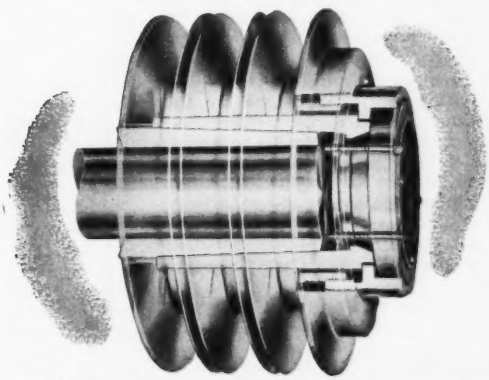
• Longyear engineers, qualified by years of experience, will help you select the tools best suited to your operation. For prompt attention to your requirements write to us TODAY.

## E. J. LONGYEAR COMPANY

CANADIAN LONGYEAR, LIMITED, NORTH BAY, ONTARIO, CANADA

DIAMOND CORE DRILLS • CONTRACT CORE DRILLING
SHAFT SINKING • GEOLOGICAL INVESTIGATIONS

# Let's get our heads together about speed control — and PROFIT!



*American Adjustable-Speed Drives are available in A, B, C, Q, and R Section Grooves.*

When the competition is tough—there's a lot of profit in that final extra production from every machine in a shop. And that extra production—that touch of gold—is what we'd like to talk over with you.

The American Adjustable-Speed line can add that touch of gold to your production . . . quickly, easily, inexpensively. YOU GET:

**• Precision Speed Control • High Production at minimum capital and maintenance cost • Better quality control • Flexibility to meet variations in rated motor speeds or calculated speeds of belt drives**

American's exclusive double-taper hub construction maintains speeds at your selected setting and long life of sheave and belts. Sleeves expand to lock flanges in position and the sheave to the shaft during operation . . . there's no chance for wear. Installation or removal is no problem . . . tapered bushings make American Adjustable-Speed Sheaves easy on and easy off the shaft.

Get the profit story of the American Adjustable-Speed line and see how it can help you to more profit. You're not obligated when you clip and mail the coupon today.

## Other Products

Speed Reducers and Overload Releases

Econ-O-Matic Motor Bases

Multiple-Groove Wedg-Tite Sheaves

Wedgbelts

Steel Split Pulleys

Hi-Torque Motor Pulleys

Conveyor Pulleys

Backstops

***At the profit end of the machine***

**Power Transmission by**

**AMERICAN**

**PULLEY COMPANY**

**THE AMERICAN PULLEY COMPANY**
4210 Wissahickon Ave., Philadelphia 29, Pa.

Gentlemen:

Please rush me your bulletin on the American Adjustable-Speed line.

*Name*_____

*Address*_____

*City*_____ *Zone*____ *State*_____

BUCYRUS ERIE

6-YARD

# 150-B

## Brings NEW SPEED, POWER, CAPACITY

## To Loading and Stripping

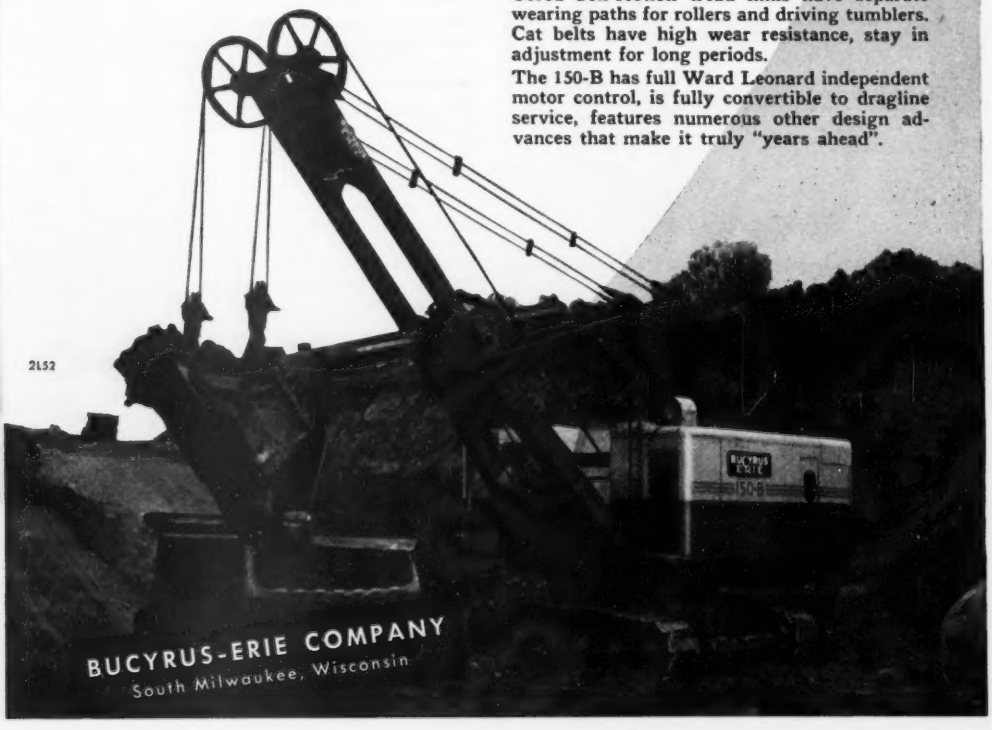
ADDED to the time-proved superiorities of design and construction which have made Bucyrus-Erie quarry and mining shovels traditionally "years ahead" are important features new to an excavator of this size, yet *thoroughly proved in the field*. Among these 150-B features are:

*Exclusive Two-Section Boom* with tubular dipper handle free to rotate in saddle block. Used with outstanding success on Bucyrus-Erie's large stripping shovels for many years, this design speeds the working cycle and permits increasing the payload because it reduces front end weight materially — yet provides enormous strength. Upper boom section carries only load resulting from pull of ropes, strong trussed lower section transmits directly to the revolving frame the vibrations, torsional and shock loads set up in digging. Rope crowd is quiet, positive, with crowd machinery located on the deck.

*Powerful New Main Machinery* designed for double twin hoist, smoothly delivers power where you want it, when you want it. Hoist machinery pulls dipper straight through tough banks with steady positive action. Fast smooth swing, with quick acceleration and deceleration, shaves seconds off every cycle.

*Larger Stronger Mounting* has new propelling machinery arrangement, which provides rapid engagement of the propel for fast move ups. Cored box-section tread links have separate wearing paths for rollers and driving tumblers. Cat belts have high wear resistance, stay in adjustment for long periods.

The 150-B has full Ward Leonard independent motor control, is fully convertible to dragline service, features numerous other design advances that make it truly "years ahead".

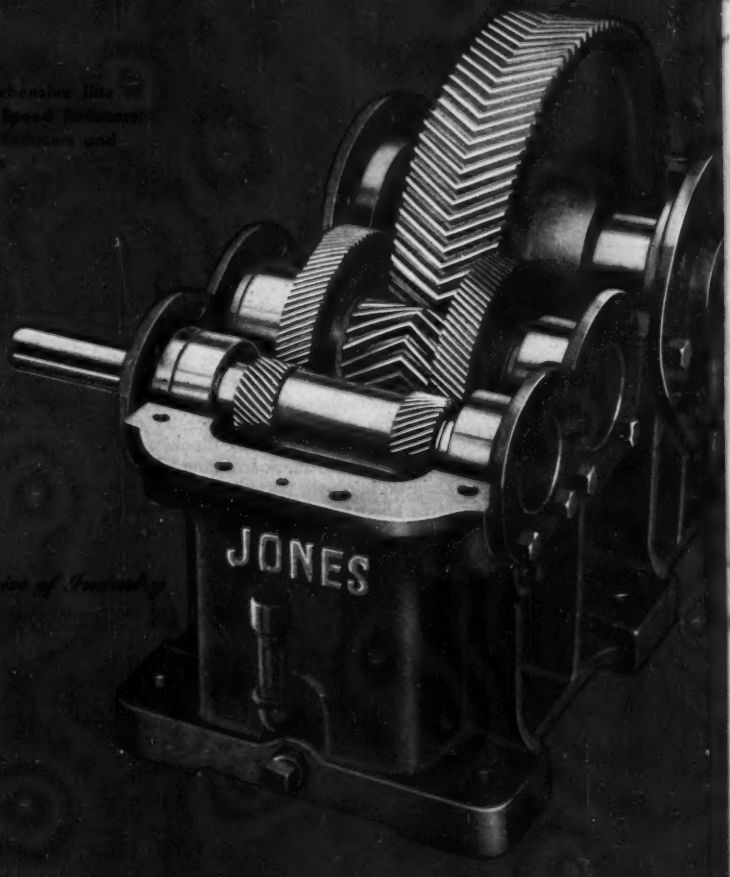



BUCYRUS-ERIE COMPANY
South Milwaukee, Wisconsin

## MORE STANDARD SIZES TO CHOOSE FROM

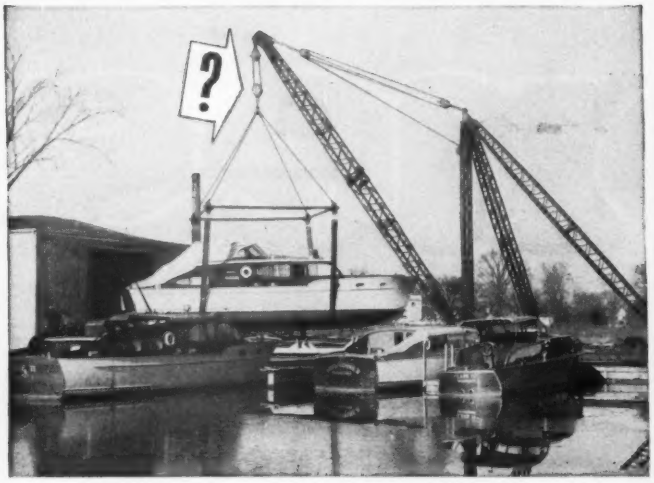
In the range from 1 to 400 horsepower JONES offers the most complete line of Herringbone Gear Speed Reducers available *ANYWHERE*.

# Jones




W. A. JONES FOUNDRY & MACHINE COMPANY, 4413 Roosevelt Road, Chicago 24, Illinois

# What's the capacity of this block?




## If you don't know.. don't use it!

An overloaded block can be as expensive as it is dangerous. For example, just imagine dropping a cabin cruiser!

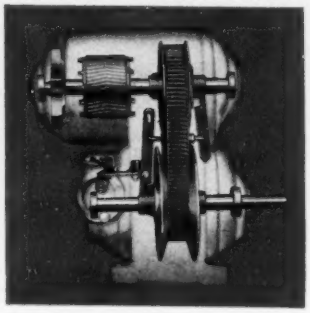
To help prevent such catastrophes, American CROSBY Wire Rope Blocks are *Load-Rated*. The safe working capacity of the block is embossed in the side plate. American CROSBY Blocks are built with the same rugged quality found in giant American crane blocks. Individually packaged, they are delivered in clean, perfect operating condition. Sold by distributors and supply houses everywhere, and made by the makers of genuine Crosby Clips, the famous wire rope fasteners . . . AMERICAN HOIST & DERRICK COMPANY, St. Paul 1, Minnesota.

American CROSBY Load-Rated! WIRE ROPE BLOCKS

## Magnetic Separator Efficiency Improved With Speed-Trol

*Stearns Magnetic, Inc., of Milwaukee use Speed-Trols to drive their cross belt type magnetic separators for the beneficiation of such materials as wolframite, arsenic, pyrite, and monazite. Separation is based on varying degrees of magnetic response and Speed-Trols provide the accurate control of speed and wide speed range necessary to compensate for these variables and to achieve maximum separation of magnetic materials.*

STERLING SPEED-TROL



OUTSTANDING FEATURES:

Infinite speeds—positive speed regulation—fingertip control—large indicator—positive pulleys—no springs—belt tension in proportion to load—protected—streamlined—Herringbone Rotor—through ventilation—versatile mounting—NEMA dimensions—shock absorbing—quiet operation—rugged—compact—dependable—long life.

*70 ILLUSTRATIONS* showing how Sterling Electric Power Drives reduce production costs. Write for Bulletin No. B 124.

STERLING ELECTRIC MOTORS

Plants: New York City 51; Van Wert, Ohio; Los Angeles 22; Hamilton, Canada; Santiago, Chile
Offices and distributors in all principal cities

# Announcing

# A GREAT NEW LINE

of St. Paul hoists and Dump bodies!

**Engineered to increase your earnings with any truck!**

Here is a quick "preview" of the greatest St. Paul line we've built in 40 years . . . 15 completely new models of hydraulic hoists with over 50 engineering improvements . . . 3 new lines of dump bodies, featuring stronger, wider side braces and more massive hardware . . . *scientifically matched for all sizes and makes of dump truck chassis.* Pre-proved by 24,000 dumps (equal to 12 years of normal service), these great new St. Paul hoists and bodies are ready to start increasing earnings on your trucks *right now.* See your truck dealer, or St. Paul Distributor for full details — or mail coupon for quick action.

## . . . Brief facts

**Up to 22% more payload capacity per dollar!** Improved lifting leverages, combined with reduced dead-weight and new "friction-free" hydraulic power give you much greater capacity for your money in the new St. Paul line.

**Smoother performance...longer life!** New all steel "uni-flex" sub-frames with sliding tension bars and rigid torque tube take critical strain off truck frame . . . equalize loads on strut arms for better alignment. Replaceable bushings provided at principal wear points.

**15% to 50% lower installation costs!** No re-work or major chassis alterations needed, since all new St. Paul hoist components (except pumps) are above truck frame. Pre-drilled long beams, adjustable attaching brackets and dash mounted controls mean further savings.

*Mail coupon for free booklet*

**St. Paul HYDRAULIC**

Hoists • Dump Bodies • Refuse Loaders
Truck Pumps • Elevating End Gates

**ST. PAUL HYDRAULIC HOIST**
Customer Service Department
36121 Main St., WAYNE, MICHIGAN

*Send* free booklet describing new St. Paul hoists and dump bodies.

Name .....
Position .....
Employed by .....
Address .....
City ..... State .....

S-HSC-1

## Industrial rubber products especially built for LONG SERVICE

# PIONEER

**Pioneer Products are built for "heavy weather"**

Much Pioneer hose is used for refueling U. S. Naval vessels at sea. (Official U.S. Navy Photograph)

One look at this dramatic photograph shows the kind of life that fuel hose leads at sea. Snaked out over the chasm between two rolling ships, this petroleum hose permits the transfer of hundreds of tons of fuel in a very short time. Flexibility, durability, resistance to petroleum products, to salt air and salt water are just a few of the qualities Pioneer Rubber Mills builds into the hose used for this purpose.

Do you have a situation that calls for a "heavy weather" industrial rubber product? Consider calling in the Pioneer organization for its exceptional service, truly long-life products, and 63 years of specialized experience. Call our nearest representative or write to the Pioneer office for his name.

## PIONEER RUBBER MILLS

*Pioneering in rubber since 1888*

**BRANCHES:** CHICAGO • CLEVELAND • DALLAS
LOS ANGELES • MILWAUKEE • ST. LOUIS • SAN FRANCISCO

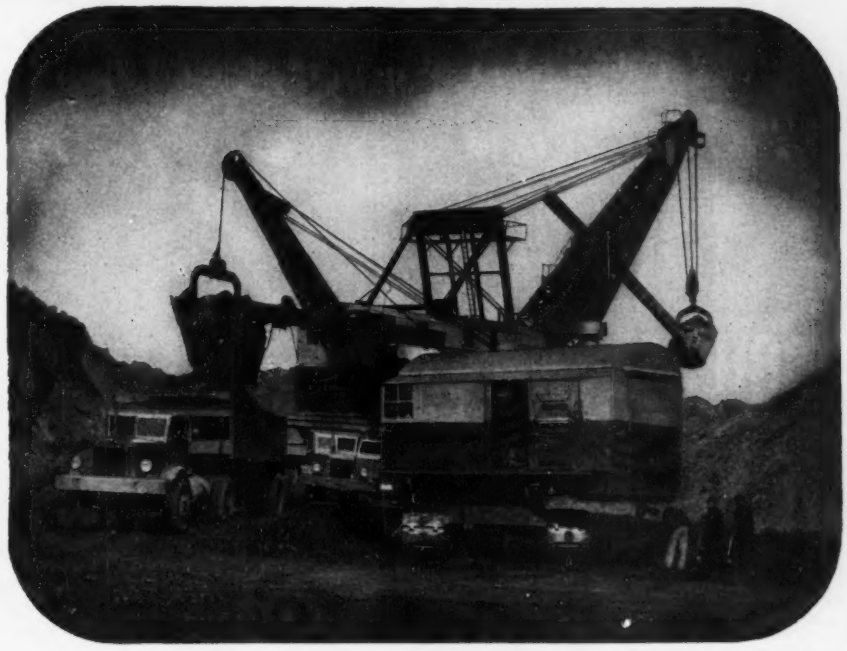
**FACTORIES:** PITTSBURG, CALIFORNIA

**BELTING • INDUSTRIAL HOSE • FIRE HOSE • PACKINGS**
**RUBBER COVERINGS AND LININGS, SPECIALTIES**

**MAIN OFFICE:** 345-353 SACRAMENTO STREET, SAN FRANCISCO 11

*Distributors in other principal cities*

# WIRE ROPE



## *This is the most economical rope we've ever made for mining*

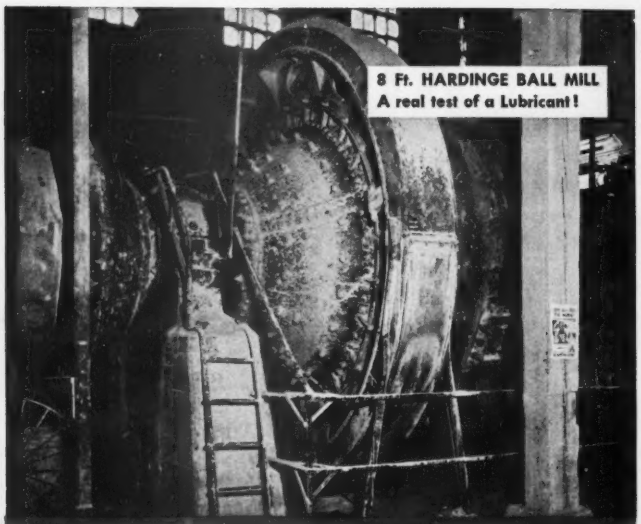
ROEBLING is the best known name in wire rope. That's partly because we were the first wire rope maker in America. But more than that, we've always led in developing better wire and better rope for every purpose.

Today's Roebling Preformed "Blue Center" Steel Wire Rope is the miners' best choice for efficiency and long life. This rope has *extra* resistance to crushing and abrasion . . . stands up under rough going. It saves you time and cuts costs.

There's a Roebling wire rope of the right specification for top service on any job. Call on your Roebling Field Man for his recommendations. John A. Roebling's Sons Company, Trenton 2, N. J.

**ROEBLING**

ATLANTA, 934 AVON AVE • BOSTON, 51 SLEEPER ST • CHICAGO, 5525 W. ROOSEVELT RD • CINCINNATI, 3253 FREDONIA AVE • CLEVELAND, 701 ST. CLAIR AVE, N. E. • DENVER, 4801 JACKSON ST • DETROIT, 915 FISHER BLDG • HOUSTON, 6216 NAVIGATION BLVD • LOS ANGELES, 5340 E. HARBOR ST • NEW YORK, 19 RECTOR ST • ODESSA, TEXAS, 1920 E. 2ND ST • PHILADELPHIA, 230 VINE ST • SAN FRANCISCO, 1740 17TH ST • SEATTLE, 900 1ST AVE S. • TULSA, 321 N. CHEYENNE ST • EXPORT SALES OFFICE, TRENTON 2, N. J.




# "LUBRIPLATE No. 630-AA is practically a universal lubricant"

—so writes the SPOKANE PORTLAND CEMENT COMPANY of Irvin, Wash.

"**Lubriplate Lubricants** enabled us to cut the number of lubricants we were using to about half, but even then we were still using five different LUBRIPLATE Products. With the introduction of LUBRIPLATE No. 630-AA, we were able to reduce our requirements still further. Today we are satisfying all our needs for solid type lubricants with only two LUBRIPLATE Products. LUBRIPLATE No. 630-AA might almost be considered a Universal Lubricant. Furthermore, LUBRIPLATE No. 630-AA has effected a marked savings in lubricants and labor."

*Frank D. Neill*
General Superintendent

## SIMPLIFY YOUR LUBRICATION SCHEDULE

**Lubriplate Lubricants** set new high standards: They reduce friction, wear and power consumption. They prevent rust and corrosion of bearings, parts and product. They last longer than ordinary lubricants. LUBRIPLATE Lubricants are available from the lightest fluids to the heaviest density greases to meet all conditions, usual and unusual. Write for case histories of the use of LUBRIPLATE in your industry.

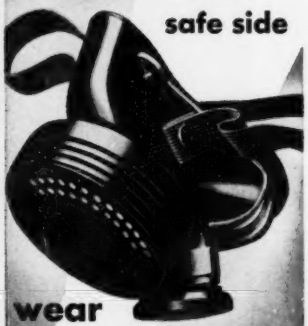
**LUBRIPLATE DIVISION**
Fiske Brothers Refining Company
Newark 5, N. J. Toledo 5, Ohio

*DEALERS EVERYWHERE . . . CONSULT YOUR CLASSIFIED TELEPHONE BOOK*

# LUBRIPLATE *THE MODERN LUBRICANT*

# WILLSON
dependable respiratory protection

keep on the safe side



wear WILLSON RESPIRATORS

Like these comfortable respirators, all Willson safety equipment is made after careful study of industry's needs. Through this continuing research you get many comfort and safety improvements first in Willson products. Ask for Willson—largest line of respirators for industry, farm and home use.

**Universal Gas Mask Style WUG**

Approved by U. S. Bureau of Mines for toxic smokes and gases, including carbon monoxide.

**Chemical Cartridge Respirator**

**No. 831** Protects against common industrial gases and vapors in low concentration. Bureau of Mines Approval No. 2302.

**No. 880** for metal fumes, mists and dusts. Same facepiece as No. 831, with replaceable dust filters. Comfortable under welding helmet. Bureau of Mines Approval No. 2149

*See your Willson distributor or write for bulletin*

**WILLSON PRODUCTS, INC.**
**225 Washington St., Reading, Pennsylvania**

# REVERSE FEED OR STANDARD FEED

# STOPERS

## THREE SIZES • TWO STYLES SIX MODELS

From the compact Model 200 to the heavyweight 600 here is drilling versatility to meet every hard rock requirement.

REVERSE FEED MODELS are now available in all sizes, permitting column or bar-mounting as shown in illustration above.

Simple design, air cushioning, extra large bearing surfaces and other features keep these tools on the job longer, *sharply reduce out-of-service repairtime.*

For on the job demonstrations of any of these great new Thor Stopers, write or wire Independent Pneumatic Tool Co., Aurora, Ill., or Los Angeles, Calif.

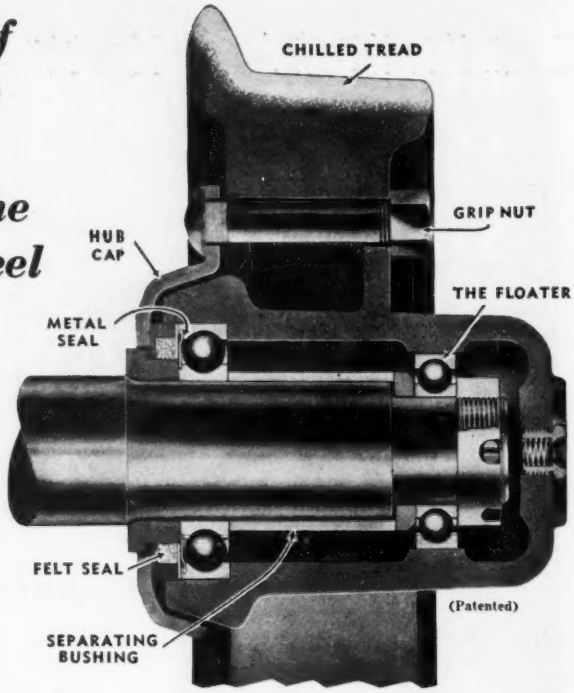
**STOPER LEG**

Adapts Thor No. 38 Sinker to double duty as either Sinker or Stoper — Air Feed Leg bolts directly on cylinder, replacing Sinker backhead, Write for Circular IE-1132.

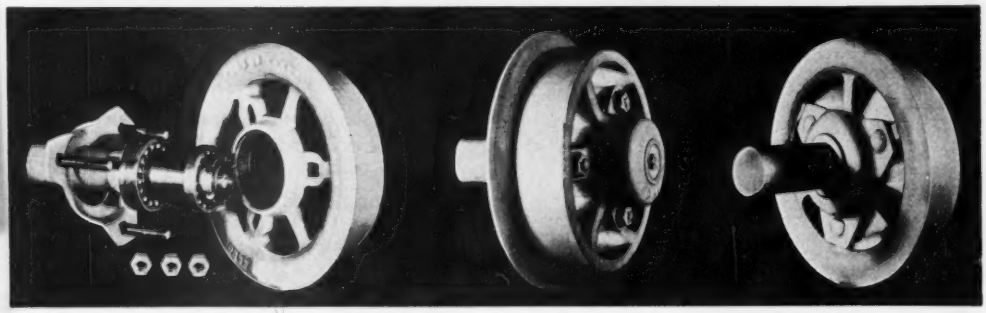
Thor PORTABLE POWER TOOLS

ELECTRIC • PNEUMATIC

# *The Big Cause of Bearing Failures Was Eliminated When We Built the S-D "Floater" Wheel*




There are never any loose or tight bearings on S-D "Floater" Ball Bearing Wheels. One of the two bearings "floats" into position, causing both bearings to stay automatically in perfect adjustment. This is one of the important reasons why you will have less breakdowns when your mine cars are equipped with S-D "Floater" Wheels! The magic "floating" bearing automatically adjusts itself when wheel is mounted and the three retaining bolts are pulled up tight. The extra large bearing absorbs all side thrusts and carries the bulk of the load. Any workman on the job can remove and replace a S-D "Floater" Wheel because "Floater" bearings always remain in perfect adjustment on the axle whether the wheel is off or on. Remember, too, that S-D "Floaters" have solid front hubs and positive back seals to keep foreign matter out and grease in! The low cost operation of S-D "Floater" Wheels is certainly worth investigating. Write today for complete information! Sanford-Day Iron Works, Knoxville, Tenn.



**SANFORD-DAY IRON WORKS**

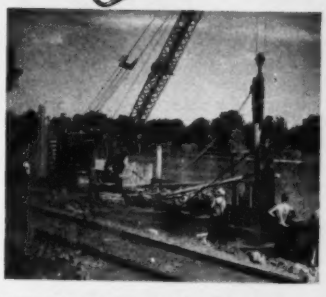
KNOXVILLE
TENNESSEE

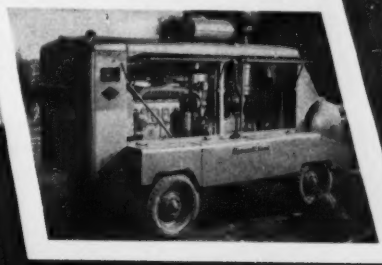
GM DIESEL CASE HISTORY No. 516-2

**USER:** Mancini-Miller-Thompsen Co., East Detroit, Michigan

**INSTALLATION:** GM 6-71 Diesel, powering an Ingersoll-Rand Gyroflow 600 cfm compressor, which supplies air to a McKierman-Terry 9B3 double-action hammer.

**PERFORMANCE:** GM Diesel engine in this compressor does the work of two engines powering 500 cfm compressors formerly needed to drive hammer. Fuel costs are halved. GM Diesel saves 15 minutes starting time.





# THIS DIESEL TAKES THE PLACE OF TWO

and cuts costs in half

GM DIESEL POWER

# "MINE SAFETY IS A SAFE INVESTMENT"

## USE BATTERY-POWERED SHUTTLE CARS

The Gould "Thirty"—
America's Finest
Mine Shuttle Car Battery

If you're already using battery powered shuttle cars, get full information on the Gould Plus-Performance Plan. It can increase battery service as much as 50%! Write Gould Battery Information Headquarters.

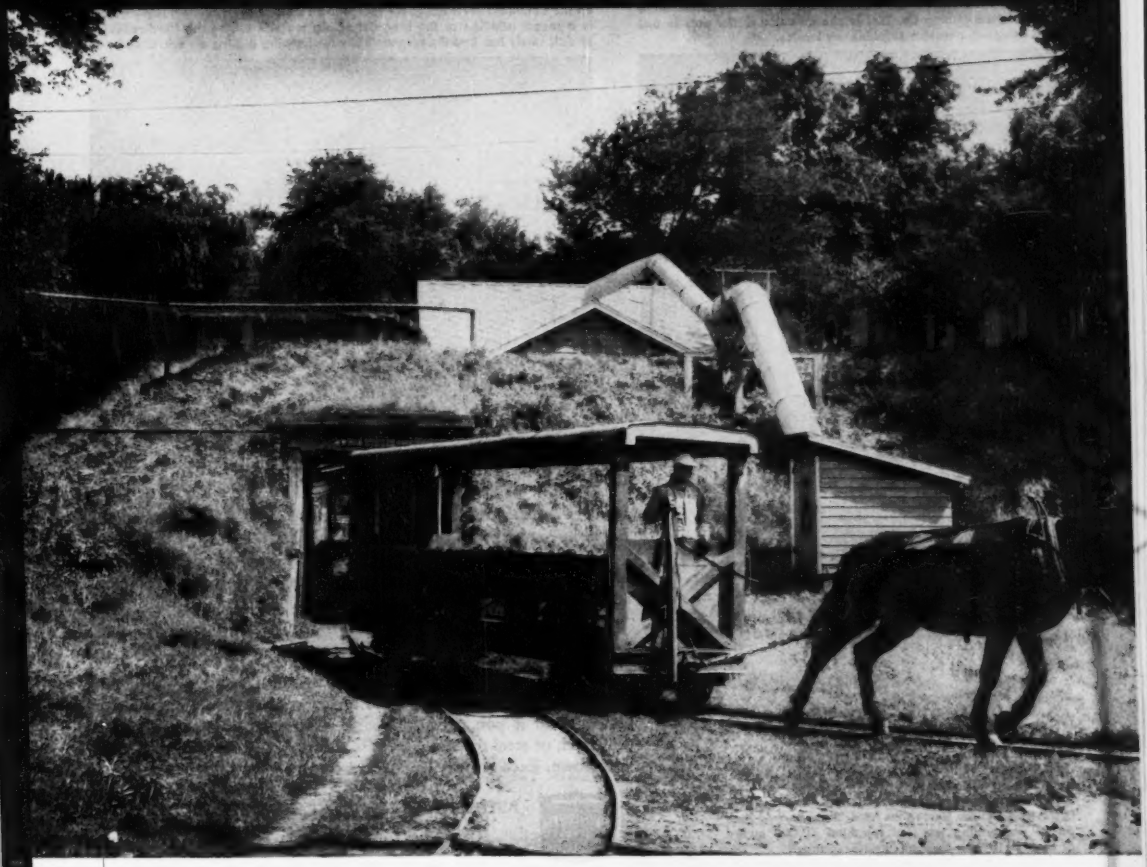
**Right now is a good time to remember —battery-powered shuttle cars are safer, almost two to one! A comprehensive, independent survey shows there are half the accidents per ton, half the accidents per shift in mines using battery-powered cars! Battery cars are permissible, won't injure drop curtains or foul ventilating doors as they pass through. The safety of battery power in your shuttle cars is mighty inexpensive insurance . . . and its cost is actually lower!**

**GOULD** *Industrial Batteries*

**GOULD-NATIONAL BATTERIES, INC., TRENTON 7, N. J.**

*Always Use Gould-National Automobile and Truck Batteries*

# PROGRESS IN EXPLOSIVES . . .



## EXPLOSIVES PARADOX

Don't be misled by the "old style" mule. This is a scene at an up-to-date dynamite plant. "New style" is the modern air conditioning equipment shown in the background.

Air conditioning enables Hercules to control atmospheric conditions while the dynamite is being packaged behind the barricade. In other words, it keeps your powder dry.

This is another example of Hercules pioneering that gives you better made explosives with better blasting efficiency.

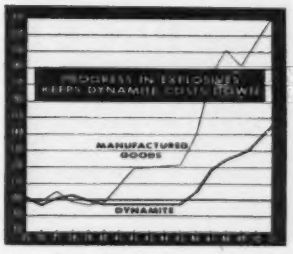



Chart shows relative stability of dynamite prices since 1935, as compared with prices of other manufactured goods. 1935-39 values = 100.

HERCULES POWDER COMPANY

INCORPORATED

*Explosives Department, 933 King St., Wilmington 99, Del.*

XR52-5

**Lead-Zinc Mining in Utah**—Bethlehem Hollow teams up with carbide-tipped bits on the 1500-ft level of the Mayflower Mine of New Park Mining Co. This jumbo-mounted drifter puts in 6-ft holes through abrasive sulphide ore bodies.

**Dam Building in Northwest**—Excavating work at the site of Chief Joseph Dam on the Columbia River called for more than 100 tons of Bethlehem Hollow. This is a recent addition to the long list of big projects where this "old reliable" of drill steels has had the responsibility for keeping drilling on schedule.

**Buffalo Underpass Job** — Rock drilling doesn't stop for chilly weather in Buffalo. Here Bethlehem Hollow bores into hard, flint-streaked rock on an excavating job that removed 70,000 cu yd of rock on a four-lane underpass contract.

# Steel that chews rock from Vermont to California

Deep-holes, short-holes. Hard, abrasive ore . . . basalt . . . dolomite. Steel bits . . . bits with carbide inserts.

Whatever the depth of hole, type of rock, or style of detachable bit, there's one hollow drill steel that does the job from coast to coast, and does it well. It's Bethlehem Hollow.

Make sure you've got this old reliable on the job!

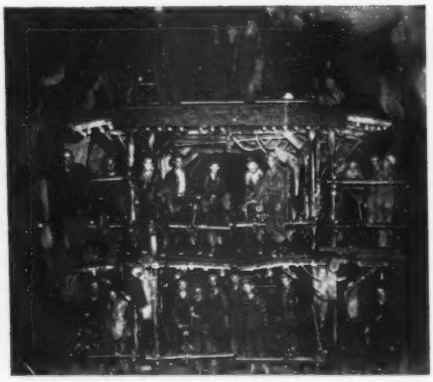
**IMMEDIATE DELIVERY**

Bethlehem Hollow Drill Steel is ready to ship from our mill depot in all popular sections and sizes. Also available from local converters. And if you need solid drill steel, quarrying steels, auger drill steel, or steel for stone-dressing tools . . . remember to specify Bethlehem. Each steel is engineered to give a lot of service.

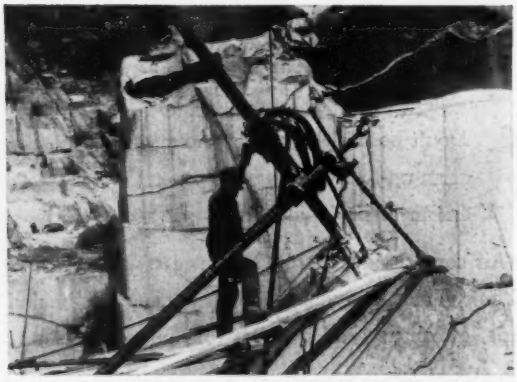
BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation



**California Tunnel Project**—Here's the three-story drill carriage and one of the crews that smashed three records for driving large-diameter tunnels. Big Creek Project No. 4 was the scene of this outstanding performance of Bethlehem Hollow.



**Quarrying Vermont Granite**—A real test of drill-steel quality is provided by "Rock of Ages," a hard, dense-grained granite. This rock drill, using Bethlehem Hollow, is mounted on a movable saddle so that a line of holes can be drilled in perfect alignment. Quarries everywhere rely on Bethlehem Hollow.

**BETHLEHEM HOLLOW DRILL STEEL**

Consolidated Mining and Smelting Company of Canada Ltd., Trail B. C. This prominent base metal producer utilizes Wheelabrator Dustubes for filtering valuable metal dust from 250,000 c.f.m. of lead blast furnace gases at 215° F.

# WHY Dustube® CLOTH FILTRATION OFFERS YOU THE MOST *in Dust and Fume Control*

**UNIFORM RECOVERIES APPROACHING** 100% of the fume entering the Dustube cloth type collector are commonplace. It is the most dependable method of dust removal that will insure a clean stack under a wide variety of operating conditions.

**HANDLES HOT AND/OR CORROSIVE GASES** A fundamental approach to cooling equipment design plus a wide selection of filter fabrics, including new synthetics, has increased the scope of cloth filtration. Gas at initial temperatures as high as 2000° can be readily cooled and filtered at temperatures well above the dew point.

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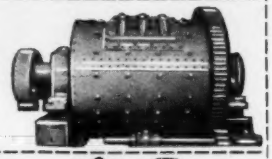

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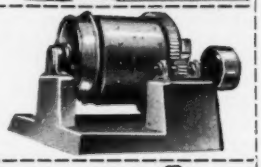

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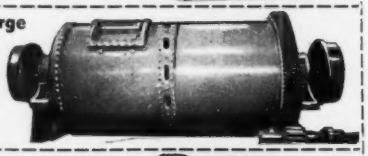

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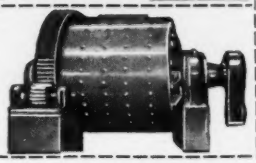

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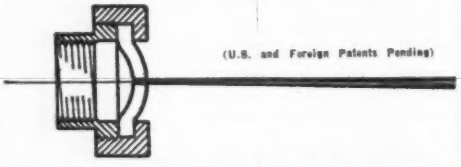

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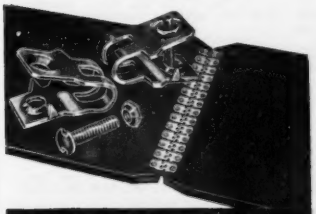

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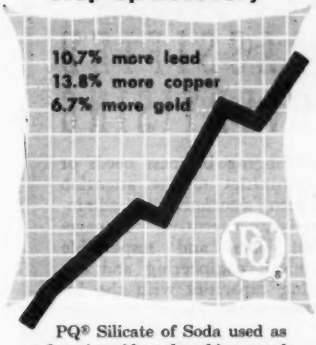


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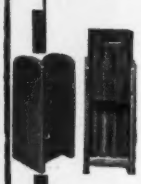

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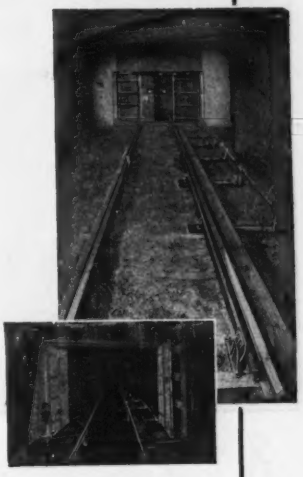

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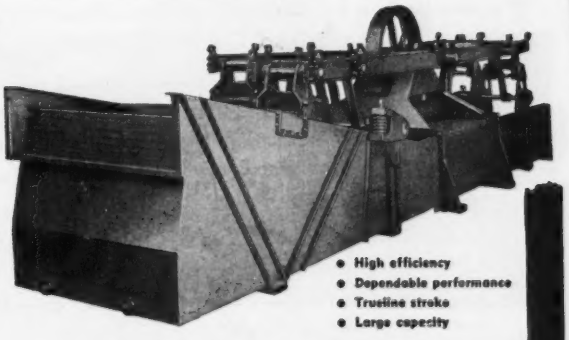

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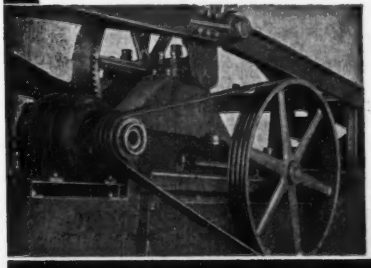

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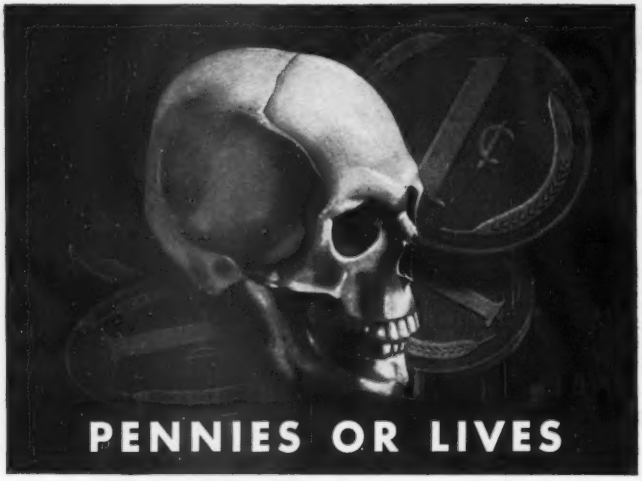

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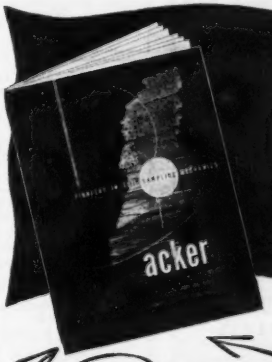


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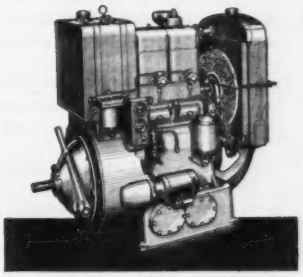

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ECONOMIC GEOLOGIST of metallic ore deposits. Teach ore deposits, polished surfaces, and mineralogy. Knowledge and experience in metal mining desirable. Location: well-known, western school of mines, on a university campus. Salary and rank open, depending upon training and experience. P-3849, Eng. & Mining Jrl.

EXTRACTIVE METALLURGIST. Half-time teaching, half time research. Research in ore preparation and concentration; including flotation. Should be able to teach these subjects and perhaps a course in process or production metallurgy. Location: well-known, western school of mines, on a university campus. Salary and rank open; depending upon training and experience. P-3850, Engr. & Mining Jrl.

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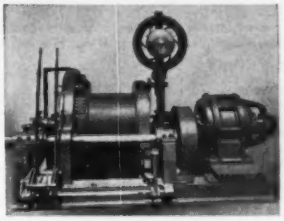
1—NEW Morse Jetair #7 Hydro-cell
1—Fagregan Single Cell
1—6 Cell Denver #18 "Sub A"
1—3 Cell Denver #21 "Sub A"
2—6 Cell Denver #21 "Sub A"



### HOISTS—ELECTRIC
1— 10 HP Vulcan #0 Single Drum
1— 15 HP Morse New Single Drum
1— 20 HP H&B Single Drum
1— 22 HP Vulcan #1½ Single Drum
1— 30 HP Vulcan Single Drum
1— 3 HP Vulcan Double Drum
1— 3 HP Single Drum
2— 52 HP Vulcan #4½ Single Drum
1— 50 HP Fairbanks-Morse Single Drum
1— 60 HP H&B Single Drum
1— 60 HP Vulcan #23ELF Single Drum
2—150 HP Vulcan Single Drum
1—350 HP Dillon-Box Single Drum

### TUGGER HOISTS
1—Dillon-Box model 3 single drum air tugger.
1—Ingersoll-Rand model 6 HC single drum air tugger.
1—Ingersoll-Rand size SNN-01-1 2 drum electric slusher hoist.
1—Sullivan class RH single drum electric tugger.
1—Ingersoll-Rand size 107 single drum electric tugger.
1—Sullivan model D211 2 drum electric slusher hoist.
2—Sullivan type HE D.C. single drum electric tuggers.
9—Sullivan type HDE D.C. double drum electric slusher hoists.
1—Sullivan model HDE 10B 2 drum tugger hoist direct driven by 4 cyl. Continental gas engine.

### FILTERS
1—3' x 4' Oliver Drum
1—4' x 6' Morse Drum
2—6' 2-disc Oliver
1—4' Single Disc Oliver
1—6' 3-disc American
1—8'6" 8-disc Morse

### BALL & ROD MILLS
1—4' x 4' Standard Ball Mill
2—6' x 48" Hardinge Conical Ball Mills with air swept equipment.
1—8' x 22" Hardinge Conical Pebble Mill.
1—3' x 8' Marcy Rod Mill

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(45)
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#60 VULCAN #1875 VULCAN
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COMBINED LOCKS, WISCONSIN

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1—13" McCully Superior gyratory crusher.
Rotary Dryers—3' x 30'—4' x 30'—4' x 40'—6½' x 50'—6½' x 60'—9½' x 70' & 7½' x 70'.
Tube & Ball Mills—6' x 9'—5' x 22'—5½' x 18'.
Fuller-Lehigh Mills—22"—42" & 52"—Bradley Mills.
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Crushing Rolls—From 12' x 24" up to 72" x 20".
1—Complete Linel Hydrating Plant.
Sturtevant Rotary Nos crushers—No. 0—No. 1—No. 1½ and No. 2.
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15'—10' & 18' Herreshoff furnaces.
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Magnetic separators—jigs—screens—classifiers and thickeners.
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New Dryers and Kilns.

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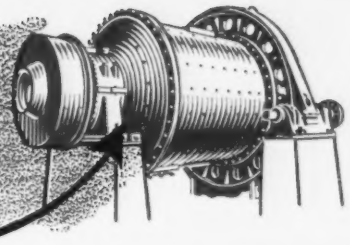
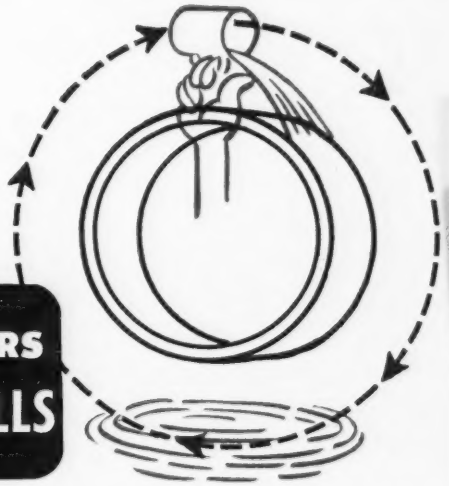


## of Allis-Chalmers Oil Lubricated Trunnion Bearing...

AN OILING BUCKET inside this Allis-Chalmers trunnion bearing revolves with the trunnion . . . lifts oil from the reservoir in the bottom of the bearing housing to an oil distributing pan above the bearing. From here it floods down onto the bearing, lubricating the full face of the bearing uniformly and continuously.

You'll always have the comforting assurance that the all-important trunnion bearing on your mill is being dependably lubricated. This assured protection of internal lubrication is standard on all Allis-Chalmers oil lubricated bearings — even on installations where a separate external oiling system is used. A-3722



**ALLIS-CHALMERS**
**GRINDING MILLS**

These protective features of A-C trunnion bearings also give you savings in power and maintenance —

- ★ An improved seal keeps dirt out of oil and has been designed to provide for mill expansion.
- ★ A hand operated, high pressure lubricant pump "floats" the mill after shut-down . . . eliminates dry starting.
- ★ If desired, an external system for filtering and cooling can be added to the internal oiling system.

*Get more facts from the Allis-Chalmers representative in your area, or write for Bulletin 07B6718A. Allis-Chalmers, Milwaukee 1, Wis.*

# ALLIS-CHALMERS

**Sales Offices in Principal Cities in the U. S. A. Distributors Throughout the World.**

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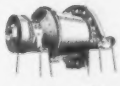
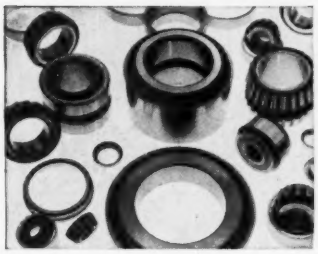


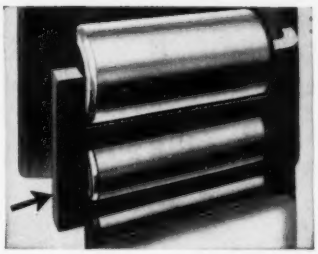
Grinding Mills

Kilns, Coolers, Dryers

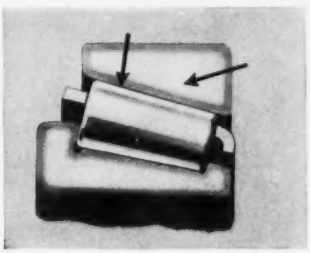
# 9 good reasons for specifying TIMKEN® bearings in your mining equipment



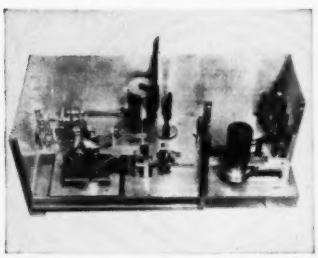
**26 TYPES.** Because Timken® bearings are made in 26 types, you get exactly the right tapered roller bearing for your job.



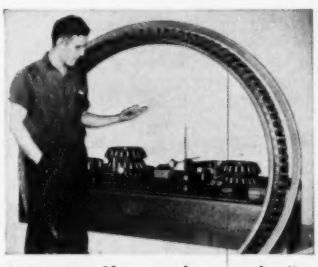
**SOFT STEEL CAGE** separates the rollers in Timken tapered roller bearings and prevents scuffing.



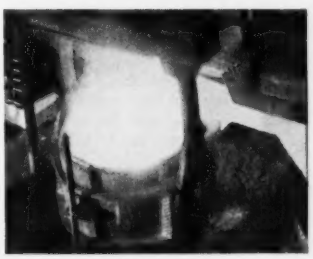
**TOUGH INSIDE—HARD OUTSIDE.** Case carburizing of rollers and races gives a wear-resistant surface, shock-resistant core.



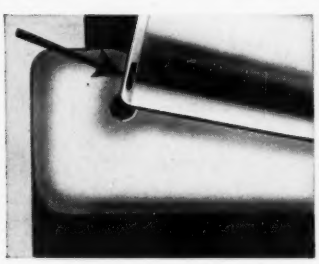
**MICRO-INCH FINISH.** With help of the profilograph, which measures surface irregularities to a millionth of an inch, the Timken Company has developed a bearing finish of micro-inch accuracy.



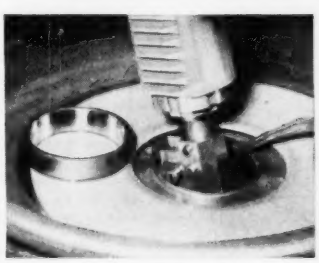
**5850 SIZES.** If you need a tapered roller bearing smaller around than your finger or as large as 71½" in diameter, you can get it from The Timken Roller Bearing Company.



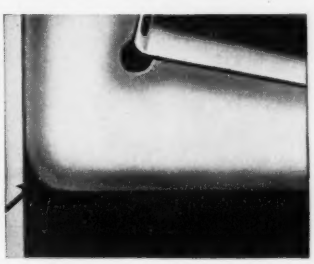
**WE MAKE OUR OWN STEEL.** Because Timken bearings are made of special alloy steel, produced in the Timken Company's own mills, they have extra strength and wear resistance.



**RIB OF CONE** maintains roller alignment, prevents skewing, assures maximum bearing capacity.



**PRECISION MANUFACTURE** makes possible bearings with a maximum runout tolerance of less than 75 millionths of an inch.



**GENEROUS RADIUS** on the inside diameter of Timken bearing cones permits greater shaft strength.

No other tapered roller bearing gives you all the advantages you get with Timken bearings. Be sure every tapered roller bearing you use carries the name "Timken", the trade-mark of The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ont. Cable address: "TIMROSCO".

**TIMKEN**

TRADE-MARK REG. U. S. PAT. OFF.

***TAPERED ROLLER BEARINGS***

**NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ◫ AND THRUST ⟷ ◫ ⟷ LOADS OR ANY COMBINATION ⟷ ◫**